AMERICAN GAS JOURNAL

88th YEAR | DECEMBER 1946 | VOL. 165, NO. 6

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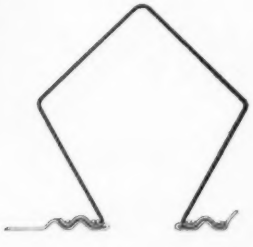
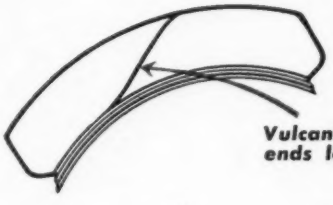
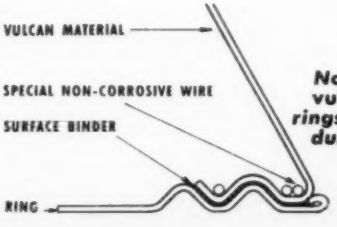


Section showing regularity of shape and hinges.



Vulcanized Seam ends leaks here.



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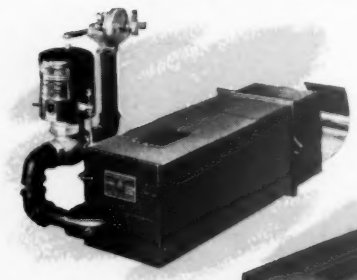

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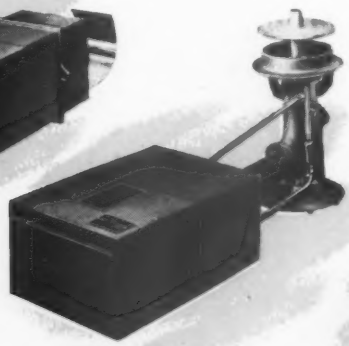

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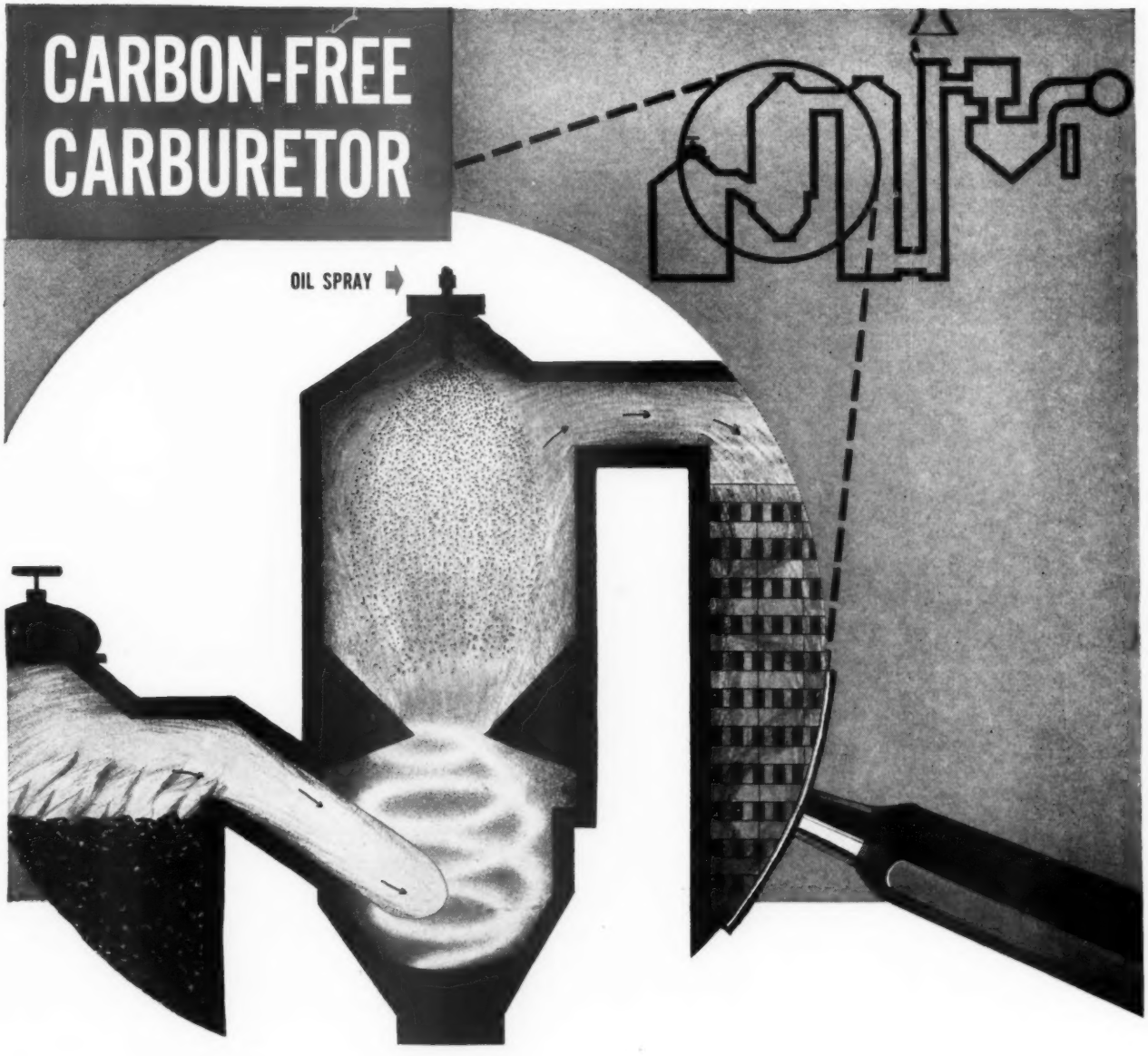

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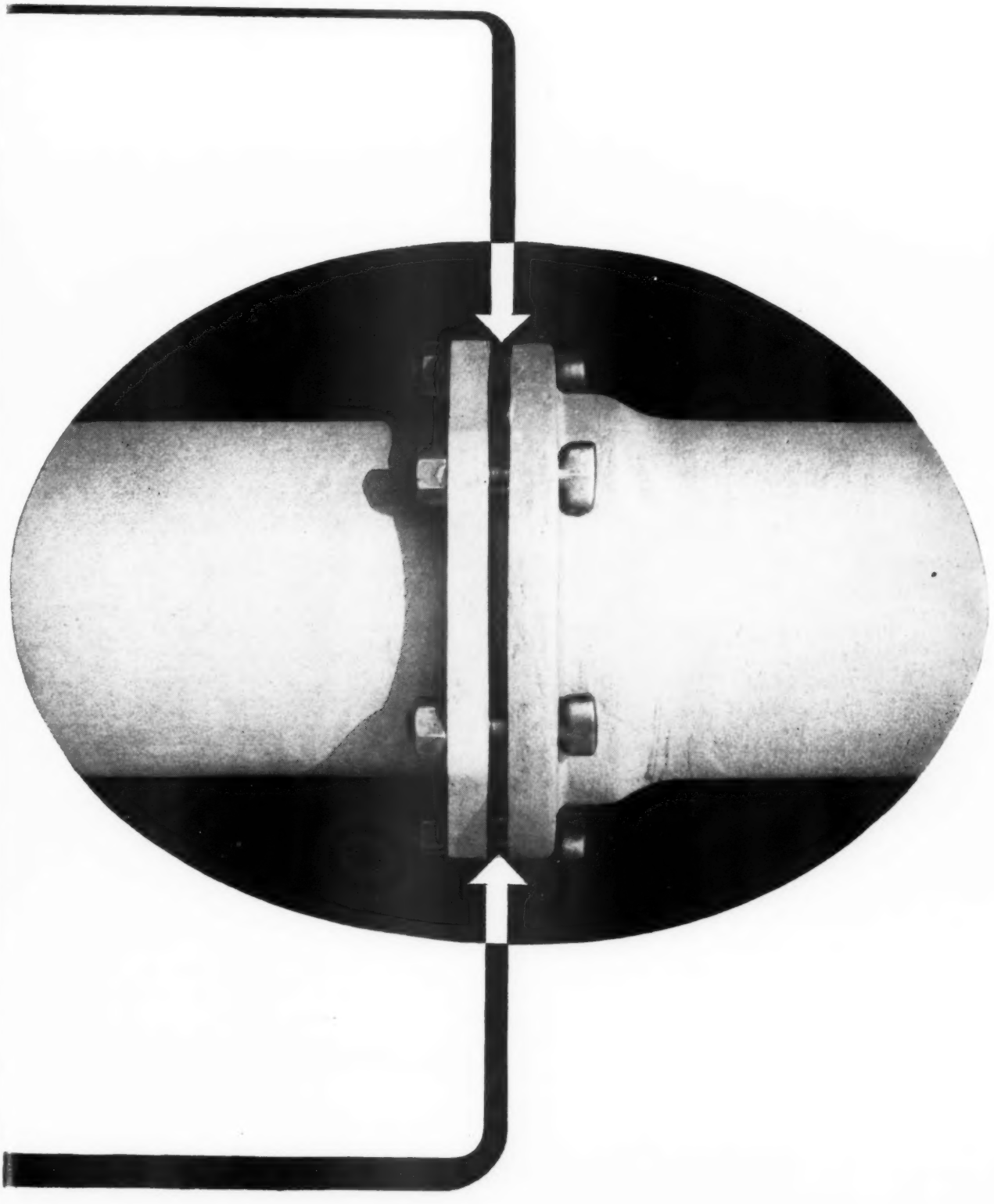

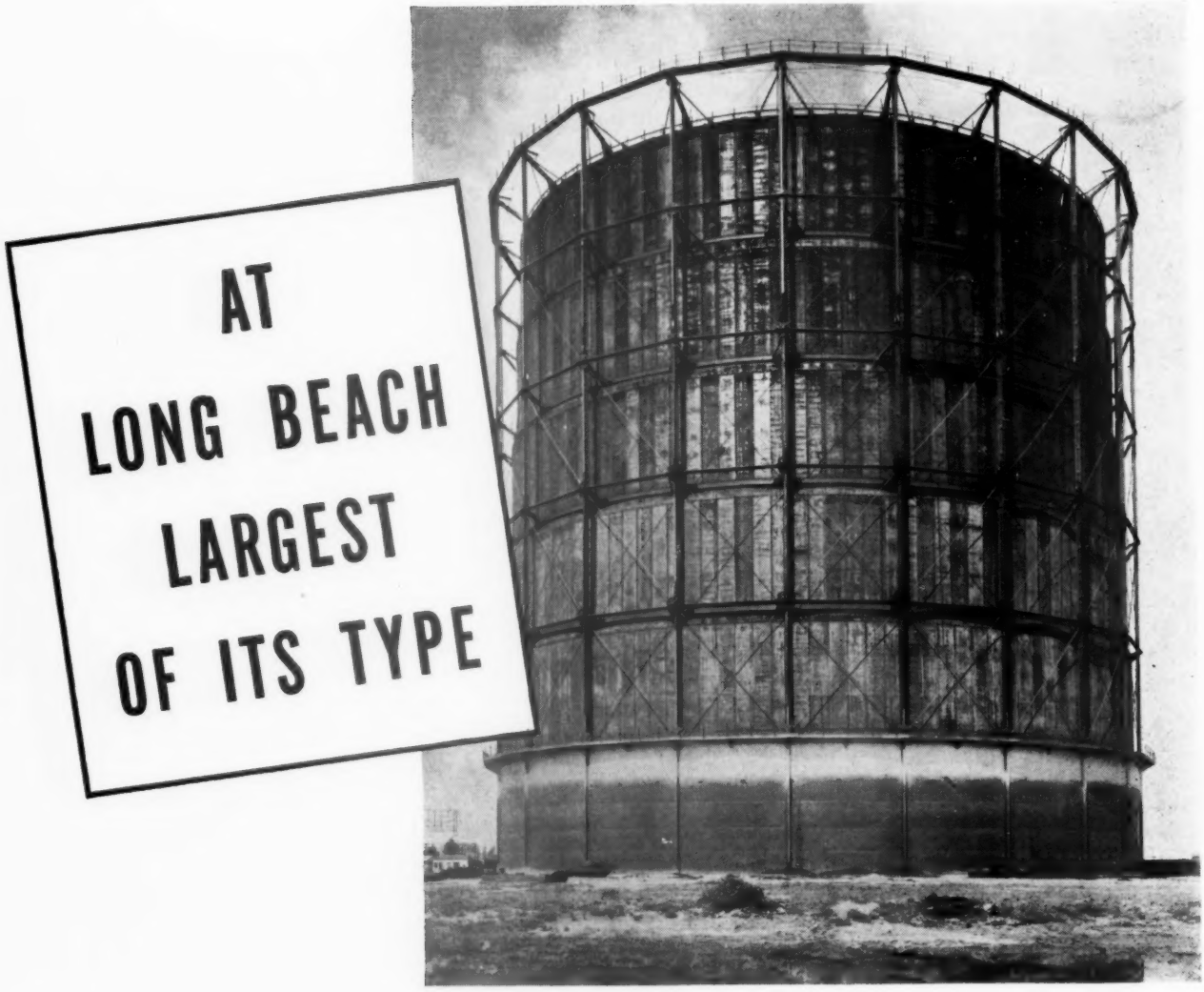

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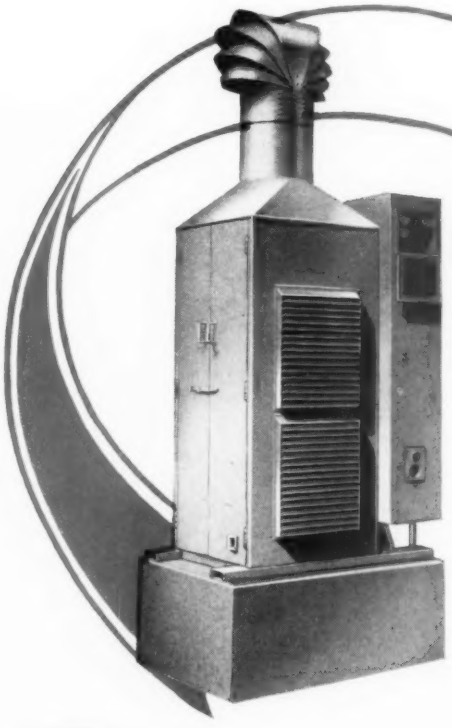

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Number 6

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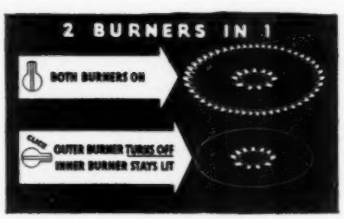

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VOLUME 165
No. 6

The Intrinsic Value of Natural Gas—A National Asset

By
Frank H. Dotterweich

Head, Department of Engineering,
Texas College of Arts and Industries,
Kingsville, Texas

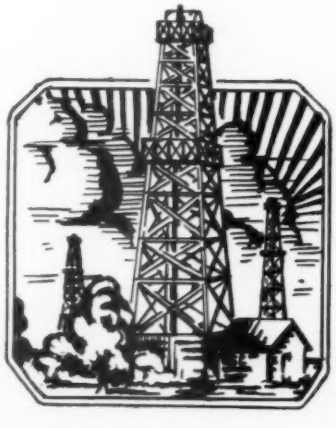
TO SET FORTH the intrinsic value of natural gas or its genuine and true value is a major undertaking indeed. Not because it is difficult to show that a real value exists, but it is difficult to include the many rightful instances which substantiate these values and indicate that natural gas has an inherent value not only in those States where it is produced and used, and those States into which transportation is permitted, but to all sections of the country—*a national asset.*

In this evaluation it may be desirable to compare natural gas with some object of recognized value such as crude oil, in its role in winning the war; and also set forth the value natural gas may acquire in the postwar period if it is permitted to serve the American public on a firm basis as a competitive fuel and as the source of many useful products. Such a discussion must necessarily include related circumstances which if not properly recognized could retard the increasing value of natural gas and also progress toward its conservation as well, thereby weakening one of our country's most stable industries—the natural gas industry—and thereby depriving the entire country from the full benefits it might derive from our valuable natural gas resources.

The role that oil has played in winning the war may be easily recognized when we recall that up to two-thirds of the tonnage in a military advance was devoted to petroleum and its products. But if it was a war of petroleum and its products, it was no less a war of natural gas and its derivatives. Since this latter fact is not so well recognized, it is desirable in the evaluation of natural gas to trace its movements from the production horizon to its end use and so arrive at its resultant value.

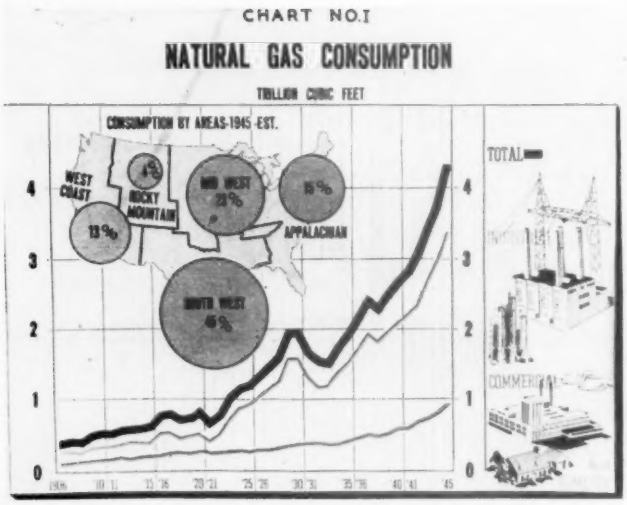
Its Role In War Years

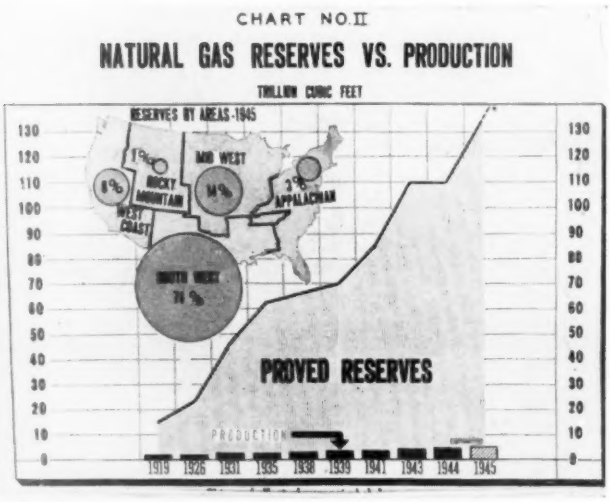
Natural gas production has kept pace with its fighting ally, oil, because it is reported (1) that during the war the petroleum industry produced 5,800,000,000 barrels of crude oil while during the same period 13⅓ trillion cubic feet of gas was produced. This amount of natural gas has an equivalent heat value of more than 2,000,000,000 barrels of oil, or over one-third of the entire wartime domestic crude oil production. Chart I clearly shows the wartime increase in natural gas consumption from 2.79 trillion cubic feet at the time of Pearl Harbor, to 4.3 trillion cubic feet annually at the end of the war—an increase of 55% in less than four years. This great increase in production was made possible by a greatly expandable natural gas industry serving many communities and army posts by keeping millions of homes heated, by rendering both heat and power to thousands of important factories and by contributing directly to the production of war material. This value of natural gas may be better understood if we try to imagine the consequences to the war effort if this great volume of natural gas had not been available. The annual increase of 1.5 trillion cubic feet of gas was produced, transported and utilized with a minimum expenditure of critical material—a feat that could not be accomplished by any of its competitors who at that time had inadequate production.



Reserves

At the present time our reserves of natural gas are set at 148 trillion cubic feet (2), note Chart II, and with proven oil reserves in excess of 21 billion barrels. Conversion to a thermal basis suggests that we as a nation have more gas than oil. Chart II also indicates the favorable ratio of natural gas production to reserves showing sufficient supplies for over a period of thirty-five years with this potential





SOURCE: BUREAU OF MINES

*Reserves as of 12/31/45. Estimated at 148 Trillion by A.G.A. Committee.
SOURCE: BUREAU OF MINES EXCEPTING RESERVES WHICH ARE FROM A RELIABLE SOURCE

supply increasing annually. Chart III confirms this prediction as we note that deeper drilling has resulted in the discovery of greater proportions of gas to oil than was previously experienced. It seems reasonable to conclude that this condition will continue, thereby adding to the present substantial reserves and insuring natural gas for many years.

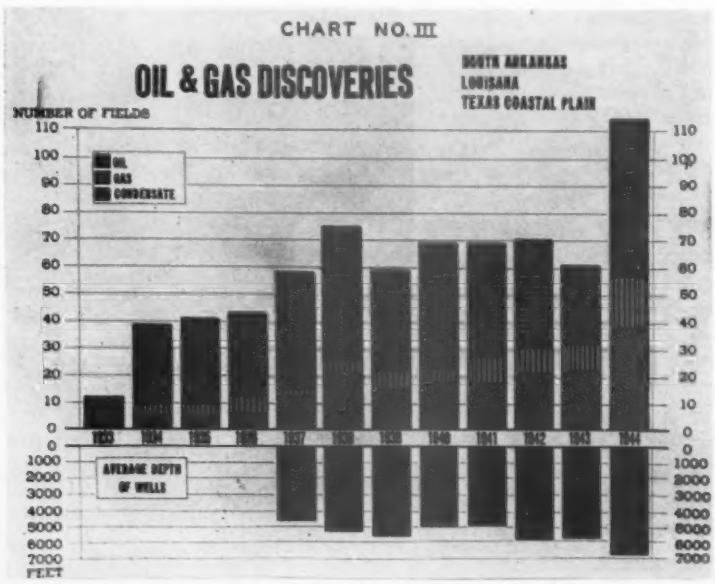
Thus during the war natural gas lived up to its name as "the perfect fuel" while at the same time one of its derivatives L.P. Gas (propane and butane) provided domestic fuel in areas where other gaseous fuels were not available. In addition this derivative of natural gas had many and varied uses as an industrial fuel as well as making important contribution to the manufacture of 100 octane gasoline, synthetic rubber and numerous chemicals.

Just prior to and during the war period many new processes and products were developed which utilize the components of natural gas as the starting raw material in the production of useful products. The processes by which the molecules of natural hydrocarbons, chiefly ethane, propane, and butane, could be shattered or rearranged by thermal, electrical, catalytic and photo-synthetic methods and allow for the addition of elements like oxygen and chlorine permitted the manufacture of super war products. In 1945 the use of L.P. Gas for synthetic rubber and chemicals was 225% over the 1943 figure of 165,900,000 gallons which is one example of this growth. This increase and total amount is impressive and indicates the increasing value of the propane and butane fractions for chemical processing. Yet only a small percentage of our natural gas constituents find their way into the chemical industry and it was new processes and new markets for dry natural gas which in general has given impetus to its rising value.

Synthetic Rubber

In the production of synthetic rubber, one of the principal ingredients is butadiene. Synthetic rubber production in 1944 found thirty-five percent of the butadiene used derived from petroleum and one-sixth of this amount was from natural gas; while at the end of the war the tonnage from natural gas for the production of this rubber "must" was 13% of the total approved plant capacity. However, a review of technologic developments suggests that one of the better methods for production of butadiene is from oxidized hydrocarbon compounds derived from natural gas. A commercial plant of this type employing the adol method of synthesis with an annual production capacity of 10,000 tons although approved, was not completed in time to share in the war program.

All rubber, whether natural or synthetic, is dependent for its tensile strength upon a derivative of natural gas—carbon black. This compound without which synthetic rubber is of little value is entirely supplied from natural gas. Approximately one-tenth of the annual production of natural gas goes into carbon black, which production reached



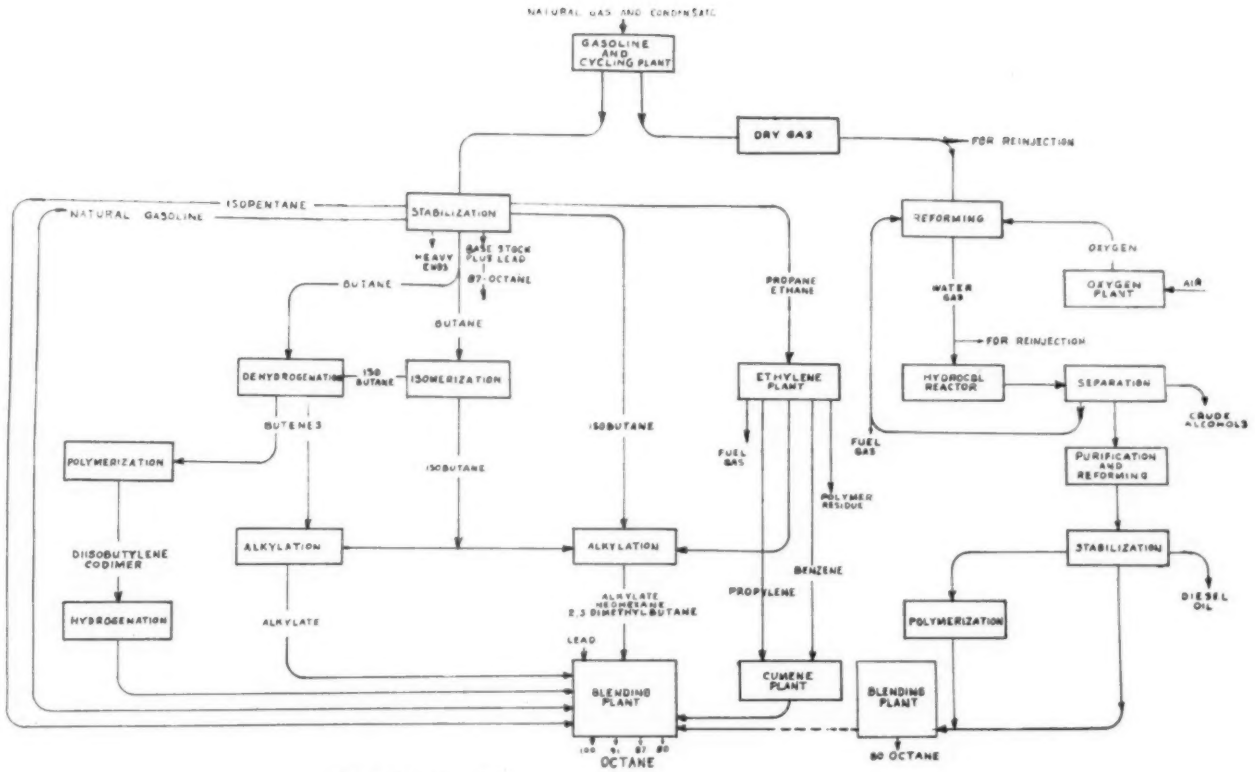


CHART NO. IV

Processes related to production of Liquid Hydrocarbon Fractions from Natural Gas and Condensate.
Shown by Field Flow Sheet Illustrations.

the huge proportion of about 1,000,000,000 pounds per year by the close of the war. The production of this invaluable ingredient to synthetic rubber processing was one of the first to feel the competitive price of natural gas when transmission lines opened new markets to the heretofore low value, sour and by-product natural gases. Advances in technics of gas purification now make available sweet gas from sour fields so that these fields are no longer limited to the production of carbon black with the distressed prices which existed prior to the war. These developments in turn will cause the carbon black manufacturer in the production of channel black in competition with other gas purchasers, to look for improved efficiency in the production of this black, thereby bringing about a fuller utilization of this natural resource as its true value is realized.

Use of Ingredients

The value of other natural gas ingredients like natural gasoline and condensates may be best seen when a review is made of the production of that very important "must" aviation fuel. The quantity of these ingredients that went into aviation fuel is extremely difficult to determine but the record shows that at the end of the war 85% of the daily production of 315,000 barrels went to refineries, some as finished high octane fuel, some to be processed into high octane gasoline and some to be blended into motor fuel. Upwards of 50,000 barrels daily of commercially pure butane, isobutane and isopentane from natural gas made possible the production of large amounts of super fuels as the war drew to a close. The value of natural gas ingredients from ethane through condensates is partly reflected on Chart IV which graphically portrays methods of preparing aviation and other liquid fuels from natural gas.

The contribution of natural gas ingredients in the production of valuable war chemicals has been partly set forth in the use of L.P. Gas. To this must be added the part played by helium. This invaluable, chemically inert gas found in some natural gases was produced exclusively and 95% utilized by our country. Many super explosives, plastics, fibers, detergents and solvents derived from natural gas have been evaluated and set forth elsewhere, but it appears desirable at this time to discuss the role natural gas played recently in the production of synthetic ammonia, a number one "must" in the manufacture of explosives.

In the manufacture of synthetic ammonia, hydrogen and nitrogen are combined under high pressure, the former being the more difficult and expensive to obtain. Prior to the war, hydrogen was obtained from water gas manufactured from solid fuels by the water gas reaction. During this period a more efficient process for the manufacture of hydrogen from hydrocarbon gases was brought to this country from Germany, but hydrogen produced by this method was restricted in use to only the hydrogenation of petroleum fractions. With the entrance of this country into the war, this efficient process became available for production of synthetic ammonia thereby making possible the production of approximately 50% the needed amount of this emergency synthetic for use in high explosives. In addition, it is estimated that upwards of $25,000,000 in plant construction costs were saved through the utilization of this process. All this was made possible when the *end use* of hydrogen *derived from natural gas* was *not restricted*.

Thus by comparison the value of natural gas has been indicated in its role of winning the war by supplying record quantities of gas and its products for industrial heat and power; and as a raw material for the manufacture of essential war products, notably high-octane gasoline, synthetic rubber, chemicals and explosives.

The Present and Potential Utilization

It has been shown that the increase in value of natural gas and its derivatives was brought about during the war period by the development of new processes and new markets. Therefore, to obtain a clear picture of the potential value of natural gas in the post war period an analysis of present and potential processes for its utilization are in order.

Following closely in the footsteps of its twin petroleum, natural gas has effectively been rearranged and decomposed by thermal and catalytic means. The latter method was adaptable on a broad scale during the war for petroleum processing. At the present time vigorous investigation is underway for the processing of natural gas into liquid fuels. As catalytic and thermal processes, the latter employing tubular and regenerative principals, were being developed on a commercial scale the use of electrical means of shattering the stable methane molecules was being investigated in this country and practiced commercially in Germany. It is interesting to note as the thermal methods are now being replaced by catalytic so in comparison when the initial work of electrical cracking is achieved these may be expected to follow the application of electric energy in a modified way, so that the hydrocarbon molecule may be changed with efficiencies of conversion approaching that which is obtained today in the isomerization of butane to isobutane by catalytic means.

Research

To these possibilities must be added the technological advances resulting from the research in connection with atomic energy by which the diffusional separation of gases may be applied to the processing of natural gas which is presently obtained with conventional absorption and fractionation procedures.

Today the value of research is finally being truly evaluated and the petroleum and natural gas industries are benefiting by their sound research programs while other industries which have failed until recently to carry on such programs now stand to benefit by the research of more progressive groups. One such development of interest was the discovery of a continuous process of flash pulverization of solid porous materials, like coal and coke, by Dr. John Yellott in the laboratory of the Institute of Gas Technology. The Institute of Gas Technology was founded by a group of research-minded, far-seeing men of the gas industry who were led by a Texan, Frank C. Smith of Houston. Only time will tell the importance of this one discovery; but it appears likely that it provides the link whereby solid fuels of the nation may be economically dispersed to a state of fineness that permits modern technology to convert them into liquid fuels when our economic life dictates. Today, Dr. Yellott, now as Director of Research of the Locomotive Development Committee of the Bituminous Coal Research Inc., reports that improvements in this process allow for the pulverization of coal to such an extent that 95% will pass through a 325 mesh screen. Thus the development of flash pulverization for locomotive propulsion introduces healthy competition for diesel power. In addition, the developments in continuous flash pulverization point the way to advances in the fields of gas purification, treatment of oil shale and treatment of tar sands. A development such as flash pulverization of coal places this fuel on a potentially competitive level with petroleum derivatives. It is not necessary to point out that control of the end use of any fuel would tend to eliminate healthy competition, retard research, promote waste and ultimately reduce the standard of our economic life.

But if the value of natural gas is to increase and true conservation practised, new uses for the large volumes of methane now available must be employed. Today we stand on the threshold of realizing that attainment which many have looked forward to and others have sought.

Fischer-Tropsch Process

In the steam conversion process previously referred to in the production of hydrogen for synthetic ammonia the first step is the production of water gas. This is the starting point of the so-called Fischer-Tropsch Process which produces liquid hydrocarbon fractions. In the above mentioned steam conversion process about one volume of methane is employed for each volume of methane converted into water gas. However, when oxygen is used, methane, steam, carbon dioxide may be made to react under controlled conditions to give water-gas directly. In this conversion sufficient energy in the form of heat, and this combined with that evolved in the synthesis of the water-gas to liquid fractions, provides for steam and power requirements. Thus, by controlling the oxidation of methane to a predetermined energy level it becomes a source of energy at the same time as being a chemical raw material. This reduces the methane requirement to about one-half. Economics of such a process are also aided by the production of so-called "cheap oxygen," and the use of other recently perfected and tried methods of heat transfer and catalytic cracking. References to Chart IV will give a general idea of such a process in which the raw materials , steam, natural gas and oxygen, unite under controlled conditions to give water gas; synthesis of this water gas to hydrocarbon gases, gasoline, diesel oil and crude alcohol fractions; reformation of the gasoline and diesel oil; and processing of by-product light hydrocarbon gases to produce marketable products of 80 octane gasoline and a better grade of diesel oil.

Hydrocol Plant

The construction of at least one such plant is presently underway at Brownsville, Texas, by Carthage Hydrocol Inc. It is reported that such a process is economically sound with natural gas purchased in the field even at an increased price. Very recently a prominent executive of a major oil company (3) confirmed these earlier predictions when he pointed out that the utilization of certain principles developed in fluid catalytic cracking processes made the conversion of dry natural gas to gasoline economically competitive with the production of gasoline from petroleum. These developments are of major importance in opening up new markets for large volumes of natural gases which at present have no outlets because of their location.

It has also been suggested that this process may be of help to the cycling industry in locations where the return of dry gas to the reservoir is necessary to prevent loss of liquefiables but an outlet to pipe lines ex-

(Continued on page 58)

Increasing Water Gas Set Capacity

By

Edward F. Kennedy

Assistant Superintendent,
Malden & Melrose Gas Light Company

THE Malden and Melrose Gas Light Co. in common with other gas properties has found itself confronted with an unprecedented and rapidly growing demand for gas. The all time peak day load of 7,862 M.C.F. occurred in February, 1946, and it is expected that the peak day load for the winter of 1946-47 may exceed 9,000 M.C.F. and may exceed 11,000 M.C.F. during the winter of 1947-48.

To meet these peak demands air-propane equipment is being installed but it will not be available for use until the latter part of the coming winter season. It is a "must" that present water gas generating equipment be operated at maximum capacity not only to meet the growing load but to secure maximum net income from this load.

For the past nine months we have been experimenting with methods of increasing the gas generating capacity of the water gas plant. Ample blower capacity had been available but we had been unable to fully utilize this capacity due to the occurrence of blow holes and blown over generator fuel at increased rates of blasting.

The work was confined to one water gas set which though originally installed for the use of light gas oil had some years ago been modernized to allow the use of high carbon fuel oils. The modernized set consists of:

1. An 11'6" O.D. by 9'4" I.D. cone top generator equipped with a back run and a retracting single nozzle solid cone oil spray. A solid carborundum inner lining extending 5'1" above the grate line had been installed. Charging and clinkering operations are manual.

2. The carburettor is the original shell designed for the use of light gas oil. The shell is 10'6" O.D. by 8'6" I.D. by 16'3" high. The carburettor is checkerless and contains ignition arches, and oil admission is secured by four multi-nozzle sprays installed through the sides below the ignition arch. Scurfing air nozzles are arranged circumferentially around the base of the shell.

3. The superheater is the original shell designed for the use of light gas oil. The shell is 10'6" O.D. by 8'6" I.D. by 24'0" high and is fully checkered in 3½" straight flues.

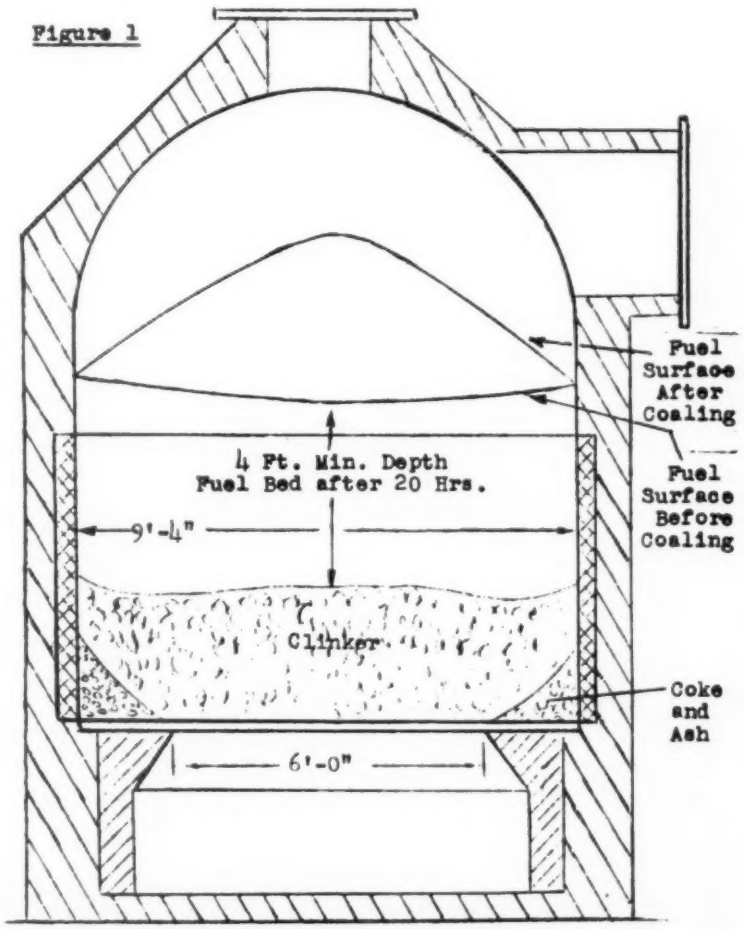
4. The blower is turbine driven delivering 31,000 C.F. of air per minute at 60" H_2O pressure, and is capable of delivering 35,000 C.F. per minute at 60" H_2O.

5. All valves are hydraulically operated from a nine lever automatic control. The superheater thermocouple and recording pyrometer are so connected with the control drive that the length of the blast is automatically varied to maintain the desired superheater temperature.

Prior to the start of experimental work, the capacity of this set operating on a 3½ minute cycle with a 10 second blow run and using ¾" screened coke and 14° Be oil was 195 M.C.F. per hour or 3900 M.C.F. for 20 hours of continuous operation. The maximum generator air rate that could be utilized was 13200 C.F.M. (average of 10000 C.F.M. during blast). The maximum fire depth that could be used was 4'6" which included the ash and clinker zone. The detailed data on operating cycle, operating conditions, and operating results are shown in table No. 1 under condition 1.

Observation indicated that the factors which were limiting the use of higher blast rates and greater fire

Figure 1



Grate Opening = 28.3 Sq. Ft. = 41.4% of Generator Area
Generator Crossectional Area = 68.3 Sq. Ft.

bed depths, and therefore limiting gas generating capacity, were:

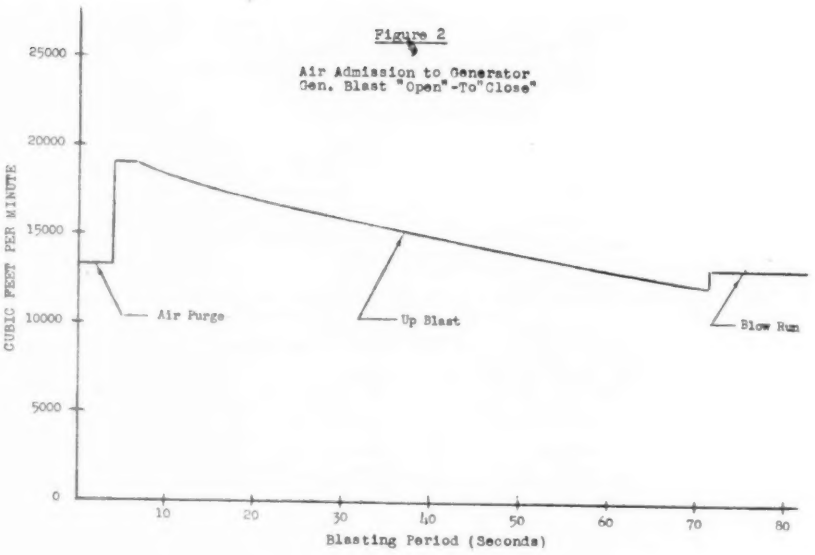
1. The ¾" screened coke used as fuel contained about 10% ash and its structure was fragile, being vertical retort coke. Breakage in handling was excessive and the screening equipment handling coke did not remove all the fines so that at times there was present an appreciable percentage of coke below ¾" in size. During fueling operations the larger sizes ran to the outer edge of the fire while the fines segregated in the center of the fire. If the fire bed depth was greater than 4'6" these fines packed in the center of the fire producing a core of high fuel density and low fire activity.

2. The air and steam channelled up through the outer more active ring of the fire bed and if generator blast rates exceeded 13,200 C.F. per minute the blast density in the outer ring became excessive. Blow holes occurred with subsequent blowing over of large volumes of fuel into the carburettor and superheater, often to a depth of 3 ft. in the base of these shells. Invariably the blow holes occurred at the generator wall.

It was evident that if set capacity was to exceed 195 M.C.F. per hour that some method would have to be devised to increase the activity of the central zone of the fire bed. The air and steam densities in the central zone and outer ring would then be more uniform. Deeper fuel beds could be used and higher blast rates could be employed without causing blow holes or blowing over of fuel.

Various fuel spreaders were made up, designed to throw the fuel towards the side of the fire bed and so maintain high sides and a low center. It was hoped to divert the air blast and steam towards the center and thereby more evenly distribute air and steam through the fire bed. The fuel spreaders were at their best heavy, awkward to handle, and did not accomplish their design purpose. At generator blast rates of over 13200 C.F. per minute blow holes still occurred and large quantities of fuel were blown over into the carburettor and superheater. The use of fuel spreaders imposed an unproductive hardship on the men and the idea was abandoned.

Blast and steam connections were extended out into the ash pit and various arrangements of baffles were installed designed to concentrate the air blast in the center of the grate. Operations were not improved, and blow holes and blowing over of generator fuel were still encountered when generator blast rates were increased above 13,200 C.F. per minute.



We next tried installing an annular steel ring on the grate with its outer edge butting against the generator side wall. This ring reduced the grate opening to 6'0" diameter and it was thought that this restriction would divert the air blast and steam from the side walls and force a higher percentage of both air and steam through the center zone of the fire bed. We were able to operate for three days at maximum blast rates of 17000 C.F. per minute at a grate pressure of 40" H_2O and a fuel bed depth of 6'6" without blow holes or blown over generator fuel occurring. We obtained hourly makes of 230 M.C.F. for 20 hours of continuous operation. The fire bed was very active in the center zone as evidenced by a low center and high sides prior to adding fresh fuel. Following these three days of operation blow holes and blown over fuel again appeared and examination of the steel ring revealed holes burned through at the sidewall edges which again allowed air to channel up along the sidewall.

The set was taken out of operation, the steel ring removed, and the brick lining in the ash pit was built out so that the grate opening was reduced to 6'0" diameter. The lining thickness was increased 9" from the ash pit floor to a point midway between the floor and grate. From this point the lining thickness tapered smoothly inward thus producing a grate opening approach similar to a venturi throat.

The added ash pit lining and restricted grate have been in operation for seven months and we are now able to operate with maximum generator blast rates of 19000 C.F. per minute and fuel bed depths of 7'0" without the occurrence of blow holes or blown over fuel. A cross-section of the generator is detailed in Fig. 1 showing the added ash pit lining, the restricted grate opening and the fuel bed characteristics before and after fueling. Observation of the fuel bed before and after fueling and during clinkering, show:

1. The typical high coned fire center after fueling burns away so that prior to fueling the fire center is depressed with high sides. This indicates increased activity in the center zone.

2. The section of the clinker zone in the corner formed by the side wall and grate is composed of ash and coke easily removed by hand bars. This indicates a diversion of air towards the center of the fire.

From March through September the water gas set was operated under condition 2 as shown in table 1. A comparison of this operation with that prior to the start of experimental work, shows:

1. The percentage blast has been increased from 30.5% to 37.2%. This, together with an increase in maximum and average generator blast rates from 13,200 C.F.M. to 18,000 C.F.M. and 10,000 C.F.M. to 13,200 C.F.M. has produced a better heat balance in the generator and a more reactive fire as shown by the air steam ratio which increased from 37.9 to 41.1.

2. Although the total time of a blow run and air purge has not been

increased, the higher blast rate, and the deeper more reactive fire bed has resulted in an increase in generating capacity from 195 M.C.F. to 250.5 M.C.F. per hour or from 3900 M.C.F. to 5010 M.C.F. on a 20 hour continuous rating. The make per square foot of grate area increased from 2850 C.F. to 3670 C.F. per hour. Grate area is taken as 68.3 sq. ft., the area corresponding to the inside diameter of the generator, since use of the actual grate area becomes meaningless.

3. The fire cleaning time has increased from 16 man-hours to 24 man-hours due to the greater weight of ash and clinker to be removed from the generator and the greater weight of oil carbon to be removed from the carburettor. The time, however, does not exceed four hours.

4. The generator and carburettor oil input rates were increased from 35 to 40 G.P.M. and from 38 to 60 G.P.M. The maximum total oil used per cycle increased from 75 gals. to 93 gals. Higher make rates reduced the time of contact so that to efficiently and properly crack the oil, the superheater temperature had to be increased from 1490° F. to 1590° F.

This operation was not secured without operating troubles in the generator and carburettor.

1. At intervals, a day's operation would occur in which large volumes of fuel would be blown over from the generator with no evidence of blow holes in the fuel bed. It was first thought that the fuel was being carried over by the air velocity through the fuel bed. It was noted that usually this blow over was accompanied by an increase in grate pressure. Further observations revealed that blow over occurred when the fuel contained excessive fines and when the generator oil spray was fouled and distributing unevenly, or if the fire depth was carried so high that the top center ran dark. What occurred was that oil carbon areas formed in the fire (aggravated by excessive fines) and that bridging occurred, the coke burning away from under the carbon bridge. The blast pressure built up under these bridges and eventually lifted that portion of the fire over into the carburettor. This trouble was corrected by closer supervision of coke screening operations, periodic changing and cleaning of the spray head and close supervision of the height of fire bed.

2. Heavy dense deposits of carbon occurred on the carburettor floor which required long arduous work to remove. This was caused by the carbon deposit stopping up the scurfing air ports and was eliminated by placing a bed of coke in the base of the carburettor to a height just above the scurfing air ports. This distributed the scurfing air over a greater area of the carburettor floor and materially reduced the quantity of carbon which has to be removed.

3. Smoky operation in which large volumes of black smoke or heavy yellow smoke occurred during the blast. The occurrence of black smoke was related to the height of the fire bed and by proper control of this height and a quick initial opening of the carburettor blast valve this trouble was eliminated. The yellow smoke was related to the operation of carburettor oil sprays and occurred when liquid oil was deposited in the carburettor floor. It was usually caused from leaking oil check valves, a carbon curtain over the spray head which prevented atomization of the oil, or fouled spray nozzle passages which reduced the nozzle tip pressure and prevented proper atomization. These troubles were corrected by periodic cleaning of check valves and spray nozzles and periodic removal of carbon from spray heads. The carburettor and superheater shells have never been enlarged since installation for the use of light gas oil when the set was equipped with an 11 foot generator, and it now appears that these two shells can vaporize and crack a maximum of approximately 70 gals. of carburettor oil in 52 seconds.

Table No. I

	Condition I		Condition 2		Condition3	
Cycle						
Up Blast	64"	30.5%	82"	37.2%	67"	35.6%
Blow Run.	10"	4.8%	7"	3.2%	12"	6.4%
Up Steam Run.	64"	30.5%	70"	31.8%	56"	29.8%
Bk. Steam Run.	54"	25.7%	53"	24.1%	45"	24.0%
Steam Purge	13"	6.2%	5"	2.3%	4"	2.1%
Air Purge	0"	0.0%	3"	1.4%	4"	2.1%
Lost Time	5"	2.3%	0"	0.0%	0"	0.0%
Total Length	210"		220"		188"	
Generator Conditions						
Fire Height	4'6"		6'6"		7'0"	
Grate Area	68.3 Sq.Ft.		68.3 Sq.Ft.		68.3 Sq.Ft.	
Fuel Used	3/4"Scrd. Coke		3/4"Scrd. Coke		3/4"Scrd. Coke	
Runs per Fueling	6		4		4	
Blast Pressure Under Grate	22" H_2O		50" H_2O		40" H_2O	
Generator Air Rate (Maximum)	13200 CFM		18000 CFM		19000 CFM	
Generator Air Rate (Average)	10000 CFM		13200 CFM		15600 CFM	
Blow Run Air Rate	8000 CFM		10000 CFM		13200 CFM	
Air Purge Rate	00 CFM		10000 CFM		13200 CFM	
Up Steam Rate	155 PPM		180 PPM		200 PPM	
Bk. Steam Rate	235 PPM		230 PPM		260 PPM	
Steam Purge Rate	155 PPM		180 PPM		200 PPM	
Generator Oil Rate	35 GPM		40 GPM		40 GPM	
Generator Up Run Oil per Cycle	30 Gals.		25 Gals.		29 Gals.	
Generator Bk. Run Oil Per Cycle	10 Gals.		10 Gals.		18 Gals.	
Total Steam per Cycle(Incl. Equiv. Bk. Run Oil)	445 Lbs.		490 Lbs.		455 Lbs.	
Total Air per Cycle	16883 CF		20110 CF		20942 CF	
% Back Steam	55.3		47.9		53.8	
Air to Steam Ratio	37.9		41.1		46.0	
Generator Air/Sq.Ft.Grate/Min.	146 CF		193 CF		224 CF	
Up Steam/Sq.Ft.Grate/Min.	2.27 Lbs.		2.63 Lbs.		2.93 Lbs.	
Bk. Steam/Sq.Ft.Grate/Min.(Incl. Bk.Run Oil)	3.93 Lbs.		3.88 Lbs.		3.58 Lbs.	
Clinkering Time (Man hours)	16		24		30	
Carburettor & Superheater Conditions						
Carburettor Oil Rate	38 GPM		60 GPM		85 GPM	
Carburettor Oil - Max.Gals per Cycle	35 Gals.		53 Gals.		73 Gals.	
% of total Oil in Carburettor	42.9%		58.9%		58%	
Superheater Temperature	1490°F		1590°F		1600°F	
Oil Nozzle Pressure	135 Psi		125 Psi		150 Psi	
Oil Nozzle Temperature	243°F		230°F		280°F	
Sp. Gravity of Oil	14.5°Be		12.3°Be		12.3°Be	
Carbon Content of Oil	7.8%		8.6%		8.1%	
Operating Results						
Make per hour	195000 CF		250500 CF		290000 CF	
Make per Cycle	12730 CF		16810 CF		18450 CF	
*Make per sq.ft. of Grate area per Hour	2850 CF		3670 CF		4250 CF	
B.T.U. of Gas	550		530		545	
Fuel per M.C.F.	17.7		20.7		20.8	
Oil per M.C.F.	4.28		3.69		4.39	
F.C.T. Efficiency	83.8		85.6		81.0	
Cycles per Hour	15.3		14.9		15.7	

*Grate area taken as generator cross sectional area = 68.3 Sq. Ft.

4. A drop of generator air from 18000 C.F.M. to 10000 C.F.M. during the period of carburettor air admission. It was found that the blower turbine governor was faulty in operation and that the turbine was falling off in speed during the blast.

When these troubles had been corrected operation at generating capacities averaging 250 M.C.F. per hour proceeded with no smoke troubles and with no trouble from blow holes or blowing over of generator fuel.

Based on the results obtained during this period of operation it was decided that a generating capacity of 275 M.C.F. per hour or a 20 hour continuous rating of 5,500 M.C.F. could be obtained on this water gas set. Changes were made in the operating cycle and blast rate and during the month of October operation was as shown by condition 3, Table 1. A comparison of condition 3 with condition 2 indicates:

1. A reduction in cycle length from 220" to 188". The generator blast rate was increased from 18000 C.F.M. to 19000 C.F.M. (Max. rates) and improvement to the blower speed control increased the average generator blast rates from 13200 C.F.M. to 15600 C.F.M. Figure 2 shows the characteristics of generator air admission. Other changes in cycle included a 6 second increase in total blow run and air purge, an increase in up and back steam rates, and the use of a slightly deeper fuel bed.

2. As a result of these changes the generating capacity of the set increased from 250.5 M.C.F. per hour to 290 M.C.F. per hour and the make per square foot of grate area increased from 3670 C.F. to 4250 C.F. per hour. A 20 hour continuous rating at this generating rate would be 5800 M.C.F. per day. We have not had sufficient load to operate for a greater period than 13 hours per day but on the basis of this operation we are confident that a 20 hour rating of 5500 M.C.F. can be maintained.

3. To maintain the required gas calorific value, the carburettor oil input rates had to be increased from 60 G.P.M. to 85 G.P.M. and the total oil input to the set per cycle had to be increased from 93 gals. to 112 gals. The carburettor and superheater have to handle a maximum carburettor oil input of 73 gals. per cycle. To completely vaporize and crack the oil at the higher oil rates necessitates a superheater temperature of 1600° F.

Operation under condition 3 has been satisfactory and we are confident in assigning a 20 hour continuous rating of 5500 M.C.F. to the water gas set on which we have been carrying out the experimental work. This is an increase of 1600 M.C.F. or 41.0% based on what was formerly considered the 20 hour rating of this set. What work we did on providing a restricted grate opening simply allowed us to utilize fully the air rates which the blower could supply and not produce blow holes with subsequent blowing over of large volumes of generator fuel.

We are limited to further increase in generating capacity on this set not because we have reached maximum blast rates and oil input rates, but because of the great amount of clinker and ash which accumulate and have to be removed after 20 hours of operation at these gas generating rates. Further increases will have to be secured by the use of a lower ash content fuel or by providing equipment for continuous charging and clinker removal.

Presented at N.E.G.A. Operating Division Meeting, Springfield, Mass., October 24, 1946.

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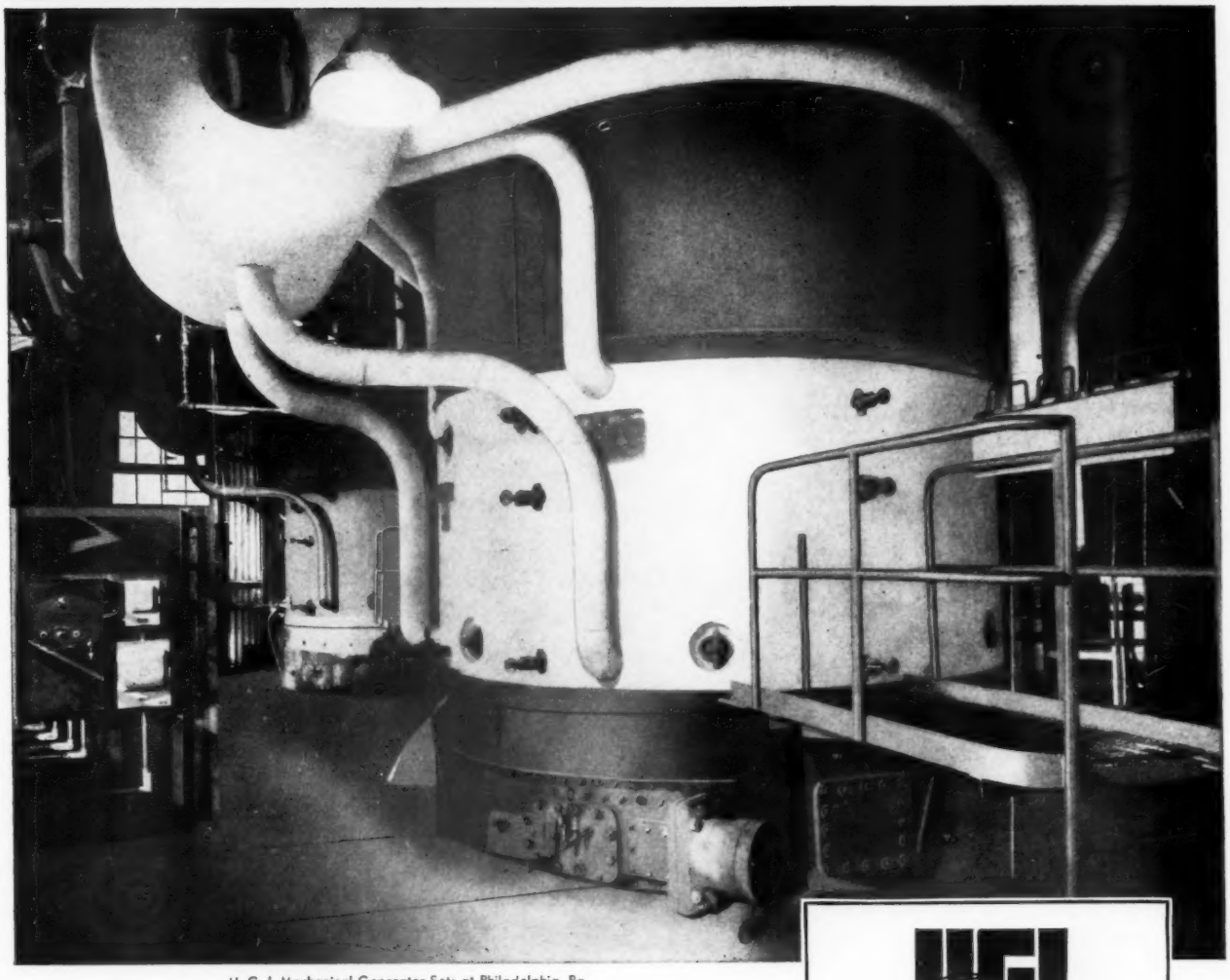

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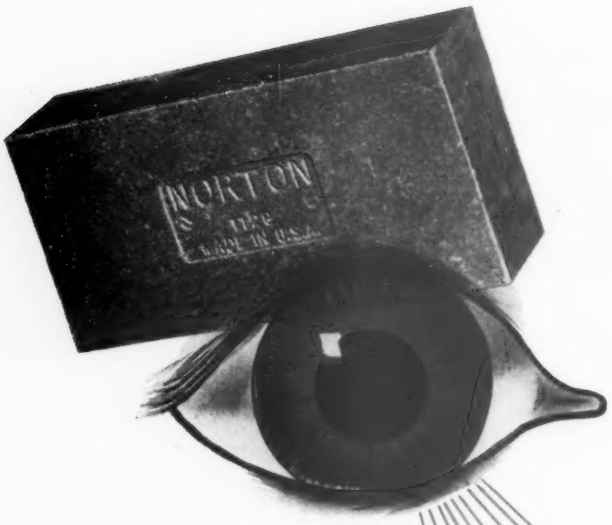

THE REFRACTORY *looks* AT THE JOB

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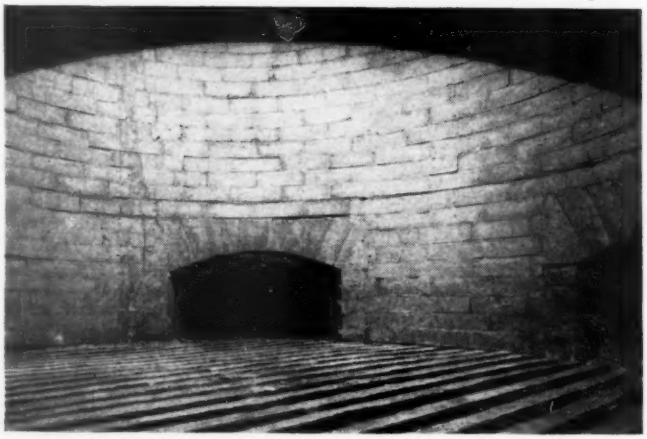

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*CRYSTOLON — Trade-mark Reg. U. S. Pat. Off.

Standard Brass Foundry Practices As They Affect Gas Sales

By
William Wirt Young
W. Wirt Young & Associates
Waterbury, Conn.

SOME gas companies, which should be highly complimented, have circumvented foundry "hocus-pocus" and spent the time, money and manpower not only to "install the gas" but to *prove* its justification to management and labor alike. They have strained out the mythical gnats.

The rush of war years, the unavailability and high price of oil, have helped the gas industry in obtaining this load. Oil still being high in cost, makes the present an opportune time to make further inroads into the foundry business.

The following table of test figures proves that manufactured gas can be *sold* for brass melting:

Recently a large Eastern company, which had to replace its brass foundry melting equipment, made an extensive survey of various fuels, and the report of a committee of their engineers showed the following straight fuel comparison. This supplements, and closely verifies, the Table 1 figures on fuel cost.

TABLE #2

BRASS MELTING

Fuel	Cost per Pound	Fuel Cost
Gas	$ .00179	$ .50/M
Oil	.00185	.0738/gal.
Coal	.00570	11.56/ton
Electricity	.00362	.0125/Kwh

TABLE #1

BRASS MELTING COSTS PER 100# METAL POURED

Name	Fuel	Fuel Cost	Crucible Size	Alloy	Fuel Amt.	Fuel Cost	Metal Loss* Lbs.	Metal Loss* Cost	Metal Loss* Total
Plant A	Oil	.07/gal.	150	Red Brass	2.5	.17	4.0	.35	.52
Plant B	Gas	.58/MCF	150	Tin Bronze	359	.21	1.5	.13	.34
Plant C	Coke	11.50/ton	125	85-5-5-5	39	.22	3.23	.28	.50
Plant D	Gas	.60/MCF	150	85-5-5-5	324	.19	1.8	.16	.35
Plant E	Gas	.51/MCF	60	80-20	290	.15	.85	.07	.22
Plant F	Gas	.50/MCF	70	85-5-5-5	358	.18	1.3	.11	.29
Plant G	Oil	.074/gal.	70	85-5-5-5	2.6	.19	3.2	.28	.47

* Zinc at $ .087/# F. O. B. New York

To return to the title of this paper, an earnest and diligent search has substantiated the suspicion that at present there seems to be *no standard* brass foundry practices. There is ample opportunity for improvement in the foundries' time-honored methods, which have long out-lived their usefulness—if any. The practical effect of much of our own elaborate work has been that of doing the *wrong* things, more conveniently.

It is beyond the scope of this talk to attempt to propose what should be standard brass melting practices, as there are many controversial factors on which more information will have to be determined. I shall outline the factors involved.

While there is a certain overlapping, it will be simpler to list these factors under two main headings; those that affect *quality* and those that affect *cost*.

Quality Factors

(1) **Composition.** The composition of the various copper alloys cast in foundries is today accurately controlled. The larger foundries do their own analyzing and classifying. In the smaller foundries this is done by the supplier of the raw materials.

It might be well for the sake of completeness to list the more common varieties of cast brass with their commercial names.

(2) **Pouring Temperatures.** A number of important advantages accrue in the brass foundry from accurate temperature control of the molten metal by means of pyrometers. First, it is often desirable in a production foundry, to be able to pour a maximum number of molds from a single pot in order to obtain economy of labor. The measurement and adjustment of the starting temperature will assure the foundryman that the last molds poured will contain sound, workable castings. Second, the practical operation of the foundry is facilitated, in that the foundry difficulties arising from too high or too low temperature may be minimized. For example, cracks, blowholes, and bad surface due to high casting temperatures; and misruns and gas inclusions from low temperatures, may be avoided. Third, when the requirements of high strength and ductility are imposed on the foundryman, the maximum physical properties of a given alloy are developed by pouring at as *low* a temperature as is feasible to run the casting properly.

The maximum range of temperature encountered in the brass foundry is approximately from 1850-2350°F., depending on composition, section, and gating of the casting. The difference between correct and incorrect temperatures for any given alloy may be as small as 20°F. It is obvious that this difference cannot be determined satisfactorily by the human eye. The measurement of temperature of the molten metal by pyrometric methods leads to a greater standardization of all foundry operations, as well as an improvement in the physical properties of the alloys cast.

In general, the proper pouring temperatures for brass alloys have been determined. Unfortunately,

TABLE #3

COMPOSITION OF COMMON CAST BRASSES

Name	Copper	Zinc	Tin	Lead
Low Brass	80	20		
Rich Low Brass	83	17		
Red Brass	85	15		
Commercial Bronze	90	10		
Gun Metal	88	2	10	
Gun Metal	88	4	8	
Eighty-five three fives	85	5	5	5

the use of pyrometers in brass foundries is by no means universal.

(3) **Porosity.** A large part of porosity is due to incorrect pouring temperatures and improper gating. Some porosity is probably the result of "gassing" from products of combustion of either gas or oil. There are still controversial claims regarding the comparative porosity of brass poured from gas and oil fired crucible furnaces although recent information would indicate less porosity with gas firing. This subject will require considerable investigation before the facts can be as certained.

(4) **Mixing.** Most brass foundry men state that intimate mixing of the molten metal is absolutely necessary. We all know that in gas fired crucible furnaces, the spiral motion of the products of combustion actually swirl the metal and accomplish this mixing.

Cost Factors

(1) **Metal Loss.** Assuming good quality castings, metal loss is the greatest single variable cost that enters into brass melting. The low metal losses shown for gas-fired furnaces in Table #1 were accomplished through speed, produced mainly by the so-called "Pritchard Lining" of rammed mullite with which we are all familiar.

Soaking time, produces a lack of speed and increases metal loss. The extremely low metal loss produced in Plant E, Table #1, was attained through the use of electrical recorders to show the down time, which through education of the operators, was gradually reduced to a minimum.

(2) **Fuel Cost.** Fuel consumption on present day gas-fired crucible melters, we feel is good. Still, the gross overall efficiency is something less than 20%. Slight improvements in fuel consumption can be attained through the use of larger furnaces at the sacrifice of flexibility. Down time, holding time and burner adjustment also effect fuel cost.

(3) **Labor Cost.** Improvement of handling methods, and decrease of down time will lower labor costs. Our greatest possibility of cutting ultimate labor costs is in decreasing labor turnover. This can best be done by alleviating the terrific heat from radiation, and eliminating or minimizing noise.

(4) **Lining Cost.** The lining cost on crucible type brass melters is relatively small compared with other costs. Accurate costs have been difficult to determine, as carelessly operated foundries will reline much sooner than carefully operated foundries. Indications are that lining life of crucible furnaces is longer with gas firing than with oil. Also, the gas lining is more expensive than the oil lining. Gas definitely has a plus value in lining cost but it is small, and difficult to determine its worth. We know of a number of cases where the "Pritchard Linings" have lasted for two or more years, under sixteen hour a day operation.

(5) **Crucible Cost.** To the best of my knowledge, there have been no accurate comparisons made between crucible costs on gas and oil fired brass melters. There are so many other factors that affect crucible costs more than fuel, such as handling, uniformity of crucibles, storage, drying out, and preheating.

The above outline of quality and costs is not all-inclusive. It is presented as a basic outline for further study by the Non-ferrous Metals Committee of A.G.A.

We in the gas industry have done a fine job in securing brass melting load. We have done it the *easy* way. We have done it the *crude* way. We have done it the *unimaginative* way.

Let's not forget, the price of oil is some day coming down. Let's not forget, that induction type electric furnaces are being designed today to compete in the foundries. Let's not forget, that we too, can improve our product. My friends, I am going to gaze in our "crystall ball" and see the points we should consider in our optimum gas-heated brass melting furnace.

Our furnace should be:

(1) More *efficient*. Certainly we can improve the 20% mentioned above.

(2) Equipped for automatic temperature control, or at least for ease of temperature indication.

Our furnace should:

(3) *Not* have products of combustion contacting the metal.

(4) Provide for thorough mixing.

(5) Provide for ease of pouring.

(6) Eliminate the use of all crucibles in the furnace (and melt the brass directly in a refractory lining.)

(7) Be as fully enclosed as possible, for the comfort and health of the operator.

(8) Approach silence.

Gentlemen, when we approach the above conditions, the gas industry will have to add personnel to take care of the customers clamoring to use *our* product.

Presented at Twenty-eighth A.G.A. Annual Convention, Atlantic City, N. J., October 7-11, 1946.

Mallon, Pres. Dresser Industries Predicts 1947 Expansion

Substantial expansion in the fields of oil and gas equipment has been forecast by H. N. Mallon, president of Dresser Industries, Inc., at a meeting of sales representatives and technical experts of Dresser's member companies operating in these fields.

"Even the raw materials, out of which petroleum products are made, are expanding," Mallon said. "Natural gas can now be used as easily and economically as crude oil as the raw material for the refineries. Hydrocol plants like the one under construction at Brownsville, Texas, will be erected elsewhere to produce high octane gasoline directly from natural gas. This same conversion technique will be adapted later to produce gasoline from coal. There is literally no limit to the reserves of raw materials that can be converted cheaply into gasoline and other hydrocarbon products.

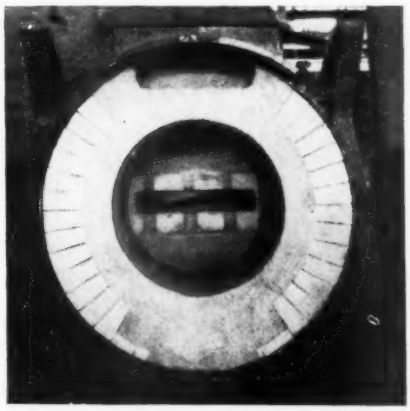
"New processes require variations in machinery design, sometimes new types of equipment altogether. Advance knowledge of these developments combined with engineering ingenuity can and will produce a large volume of business for those companies alert and adaptable enough to take advantage of the trends.

"Meantime active drilling for oil and gas and further conservation measures to prevent waste of these valuable fuels give assurance of a healthy market for standard oil field products. Add to this domestic market a foreign demand for oil equipment of all kinds in unprecedented quantities and the outlook for at least another twelve months is very favorable."

Low Temperature Insulation Developed by Dow Chemical

A newcomer in the low temperature insulation field was announced when Donald L. Gibb, manager of the plastics sales division of The Dow Chemical Company, Midland, Mich., stated that properties of the original Styrofoam have been improved and the material tailored to serve as a low temperature insulation. The final readying of the material for introduction to the market is the outgrowth of high pressure wartime, and postwar research and experimentation on expanded Styron.

Styrofoam is Styron expanded forty times. This expansion produces a pure white, lightweight, multicellular mass of foam-like material with low thermal conductivity, good structural strength and ability to resist moisture and water. Styrofoam is tasteless, odorless and has good resistance to mold and rot. Atmospheric exposure does not affect it adversely and like Styron from which is is derived, it does not lose its strength at low temperature. It shows no tendency to disintegrate or settle, another important factor in low temperature insulation.



Typical "Shamva" Mullite rammed lining backed up with insulating brick.

"Shamva" Mullite

is the most-used lining for melting brass, because—

Due to "Shamva" Mullite's resistance to high temperature, thermal shock, spalling and metal abrasion, a high percentage of all brass is melted in "Shamva" linings.

MINIMUM METAL LOSS. "Shamva" Mullite electric furnace and crucible furnace linings withstand the speed heating desirable to minimize metal losses.

MAXIMUM PRODUCTION. Because "Shamva" linings give maximum life, they keep equipment IN PRODUCTION, giving lowest cost per ton of metal melted.

To sum up, "Shamva" Mullite gives: 1. longer lining life, 2. increased tonnage per furnace, 3. faster heating with lowest metal loss, 4. reduced fuel consumption, 5. lower refractory costs.

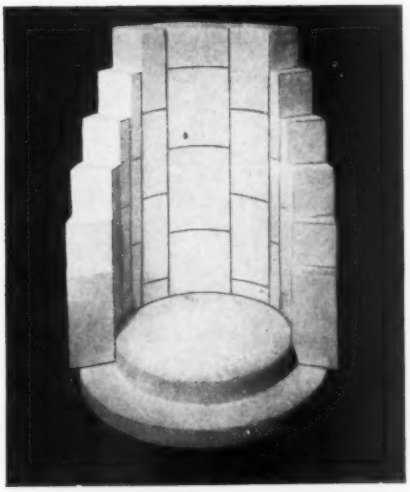
Complete Linings of "Shamva" Mullite Shapes are available for Monarch, Fisher and other Crucible furnaces.

"SHAMVA" PRODUCTS

"Shamva" Mullite is available in all standard series brick, special shapes, and cements.

Special Shapes: Complete Sectional and Crock Linings for Detroit Electric Furnaces; Complete Linings, Pot Rests and Covers for Monarch, Fisher and other Crucible Furnaces; Preformed Block Linings for Ajax-Wyatt Electric Furnaces.

Cements: SM-60 and SM-70 Hand Tamp and Power Ramming Cements for rammed linings of the "Pritchard" type; SM-90 and SM-95 Patching Cements for hot or cold application.



Complete "Shamva" lining assemblies laid up with standard brick are available for all sizes of furnaces.

IF YOU WANT MAXIMUM MELTING PRODUCTION AT LOWEST REFRACTORY COST AND WITH LOWEST METAL LOSS, YOU OWE IT TO YOURSELF TO USE "SHAMVA" MULLITE.

THE MULLITE REFRACTORIES CO.

SHELTON, CONN., PIONEERS IN MULLITE SUPER-REFRACTORIES

HERE'S WHY **Your customers will STOP**

New Servel National Campaign picked 4-to-1 in Reader Jury Surveys

-LOOK-READ this advertising

YES, we know your customers are going to read the new Servel Gas Refrigerator ads. And here's *why* we knew . . .

In a nationwide test, on streets . . . in homes . . . in railroad stations and beauty shops and barber shops . . . hundreds of persons were shown all of America's advertisements for refrigerators—including the 1947 campaign for the new Servel Gas Refrigerator. *Which ads did they like best?*

Four to one, readers picked *the new 1947 Servel campaign*. Results were the same in every test town. Simplest, most exciting of all the new refrigerator ads, it stood out as America's top refrigerator advertising.

Now these new ads—exhaustively pre-tested and slated for success—will reach your public again and again during 1946 and 1947. First ad will be a double page, four-color announcement. Ads will continue in The Saturday Evening Post, Better Homes and Gardens, American Home, Good Housekeeping, Woman's Home Companion, House Beautiful, House & Garden, Look, True Story, American, Cosmopolitan. They'll tell the story of the wonderful new Servel Gas Refrigerator to 23,663,544 families a month!

You'll get giant-size reprints of these ads. Make them work for you. Get them out front each month, every month, where shoppers will recognize and remember Servel's advertising in their favorite magazines.

Now! Greatest Servel Ever Made!
1947 GAS REFRIGERATOR STORES A BUSHEL OF FROZEN FOODS...STAYS SILENT, LASTS LONGER
Servel
The GAS Refrigerator
A Great New Servel for 1947
STORES A BUSHEL OF FROZEN FOODS...STAYS SILENT, LASTS LONGER
GAS REFRIGERATOR
EVANSVILLE
20, INDIANA

The Field of Gas in Air Conditioning

By
Wm. R. Hainsworth
Vice President,
Servel, Inc.

AIR CONDITIONING is on the road to becoming the next billion dollar industry. The Gas Industry is in a position to play an important role in the realization of this goal. In common with the development of all great industries there must be a balance of incentives and gain for each major component of the industry. In air conditioning by gas, if the customer can see sufficient advantage in the product, he will buy—if the equipment manufacturer can see adequate return for the money he risks in research and plant, he will produce—if the utilities foresee more favorable operating conditions and a chance to improve their position they will create a favorable environment to promote the growth of the industry. Without the full support and participation of each of these groups it is possible that a promising industry may be born, but it can never attain maturity. It is our belief that gas air conditioning provides an exceptional case where the interests of each of the components of an industry is so well served that in combination they are bound to result in an outstanding performance in the building of a great new industry. Much has been said and published in support of this statement. In keeping with the product trend of the industry it is proposed in this brief paper to make a package job of this information, to serve as a background for the detailed engineering and other discussions which follow on this program.

Three Functions

Although the customer is at the tail end of all new developments and receives no benefit until the equipment is installed and operating in his home or commercial establishment, he is first in the minds of the manufacturers. Unless advantages to the customer can be foreseen it is doubtful that the research and development work necessary to even start the business would be undertaken. Basically, air conditioning has to do with comfort, and is of interest to everyone. This is what it takes to create a mass market. Specifically, air conditioning has been defined in various ways. The Department of Commerce speaks of it as "The scientific preparation and simultaneous control of the atmosphere within a structure as regards temperature, humidity, motion, distribution, dust, bacteria, toxic gases or ionization. The factors which most commonly affect human comfort are temperature, humidity and air movement. The simultaneous control of these three should constitute the minimum requirements which can be labeled air conditioning, and equipment which performs at least these three functions may appropriately be termed air conditioners." The American Society of Heating and Ventilating Engineers' definition is somewhat more direct and reads: "The process by which simultaneously the temperature, moisture content, movement and quality of the air in enclosed places intended for human occupancy may be maintained within required limits." These definitions should protect the customer in his understanding of the service to be rendered by the air conditioner. Each function is directly related to promoting the greatest comfort or improving conditions of health. Nevertheless, public acceptance has been an elusive factor confused by impressions of early experiences with improperly designed and installed equipment. The old-fashioned idea that the greater the temperature difference between inside and outside, the better the air conditioner, died long ago, but its ghost still haunts the salesman. Another gremlin occasionally pokes his nose through the inlet grille. His parents, now deceased, were cold and hot blasts. Experience wtih modern systems and an accelerated educational effort are rapidly overcoming any remaining passive resistance and the way is being cleared for a true realization of the advantages of air conditioning. The creation of an environment to produce the greatest feeling of comfort, conditions which make you feel good, cleanliness within the air conditioned space, reduction of hay fever and allergy ailments, removal of impurities, more rapid recovery if you are in ill health, reduction in disturbing noises coming from the outside, are all important to the user. Most of these factors apply to both the residential and commercial consumer, but the greatest and most promising potential market is in the residential field.

Gas the Ideal Method

Admitting a rich opportunity in air conditioning, just what are the benefits of *gas* air conditioning to the user? First, gas is adaptable to the ideal application in which the varying requirements of the job are continuously matched by the capacity of the equipment. Essentially continuous operation tends to avoid peaks and valleys in both temperature and humidity. Control of the gas rate either by step or modulated operation, provides the means for matching load and capacity. Certainly an electric motor driven compressor which is operating full speed or not at all is not so flexible.

We then come to the inherent advantages of absorption and adsorption refrigeration. Compressors and motors for the refrigeration system are eliminated, with a potentially longer life, no expensive mechanism of moving parts in the refrigerant system to wear out, and reduced noise. Electric refrigeration systems are normally designed for duty throughout the year. In air conditioning, where an "off cycle" of six to eight months is common, the compression system has been subject to troublesome conditions on start up because of its mechanical nature. The gas operated refrigeration system may be off for months during the winter, ready to start as soon as the gas is turned on, with no preliminary attention. The all year gas air conditioner provides complete air conditioning with a centrally installed compact unit as compared with an electric refrigeration system combined with separate heating equipment.

Economy of Gas Installation

Another factor seldom appreciated by the consumer is the availability, for his convenience, of large amounts of energy through his gas pipe connection. Normally this is far greater that the electric wire connections and in many residences may be the equivalent of over 25 horsepower, as

compared with a 3 horsepower electric service connection. It is generally recognized that the standard outlet in the house is not capable of carrying more than a ¾ HP load. This is entirely inadequate for a complete electric refrigeration air conditioning system. Even an electric stove may require rewiring in the house or from the service lines before it can be placed in operation. Extra service wiring for an air conditioning compressor is an added expense which will not be experienced by the user of gas air conditioning.

The prewar market for air conditioning was mainly in the commercial field. The great number of small capacity commercial installations far exceeded the large capacity industrial installations in dollar volume. Very few residential installations were made. However, it is generally realized that the residential market offers the greatest potential, first in new construction and second in existing construction. The commercial market comes next, with its high potential in existing structures. It is not within the scope of this discussion to cover building statistics and the multiplicity of factors such as price, income, building cost in relation to cost of the gas air conditioner, etc. Careful analysis, including consideration of all these factors, has convinced industry leaders that an enormous market exists.

The advantages of gas air conditioning to the consumer and the large number of potential consumers provide the working foundation for the creation of a very promising *gas* air conditioning industry. The upper structure of the industry must be based on manufacturer and utility interest.

Continuity of Research

When we speak of the manufacturer we think of the product. During the war there was unbridled speculation about the marvelous advances which would show up in post war products. In some cases this was engendered by the fertile minds and publicity of the industrial designer. Time and unavoidable delays have tempered this concept but there is a continuing and perhaps saner interest in new products and services. Gas air conditioner equipment fits this pattern. During the year following the war it has become apparent that some branches of industry have been greatly accelerated through the wartime accomplishments of science, whereas others have had to pick up at the stage where the war started or have made only normal advances in research and engineering during the war period. The air conditioning industry cannot point to such spectacular developments as the use of radar on commercial vessels to detect obstacles through darkness, fog and storm at distances up to thirty miles, or the radioactive carbon and other compounds which are by-products of the atomic bomb and which will prove invaluable in tracing reactions throughout the body and in cancer research. Contrasted with this any industry based on consumer durable goods, with the possible exception of television in radio, must be content with less spectacular application of the results of war research. Nevertheless, a number of companies were able to maintain a continuity of research and development effort and field test programs on post war products without interfering in any way with their contribution to the war effort. The case history of Servel's activity in gas air conditioning may be used to illustrate one company's efforts to maintain a continuity of product development.

Program of Preparation

A study of consumer interests, coupled with a wholesome appreciation of gas industry problems and interests, led to the decision, over ten years ago, to spend substantial sums of money, now running into millions, on research, development, field testing, pilot plant operation, training program, installation, servicing, and finally, preparation for full production operations. Field tests were started in 1939 and a great number of able gas utility executives and engineers have cooperated effectively in the program. There are now over 500 installations in service and a great deal of valuable experience and information has been obtained. The Servel system was developed after careful study of and considerable experiment with many possible refrigeration cycles. It provides all the services of a complete air conditioning system and is unique in that it uses water as the refrigerant and lithium bromide solution as an absorbent in a vacuum refrigeration system. This system, to be described in detail later in the course, has no valves or pumps in the refrigerant cycle. The generator of the unit is heated by steam at atmospheric pressure obtained from a gas fired boiler. Dehumidification of the air circulated through the duct system is obtained by condensing and removing moisture at the evaporator of the unit. In the winter the atmospheric steam from the same boiler is used in a heating coil and humidification, if desired, is obtained by evaporating water into the air stream. Filters, the ventilation fan, heating and cooling system, and gas-fired steam generator are all combined in a housing suitable for central system installations. Control of heating, cooling and ventilation are available to the user simply by flipping a switch at the thermostat located in the air conditioned space.

Gas System Evolved

The system, as it is now being manufactured, incorporates many important suggestions and changes presented by utility engineers, based on their field experience with the unit. It illustrates one company's contribution in providing all the elements of safety, performance, operating costs and serviceability necessary to a volume market. In designing the system these factors have not been sacrificed to cost reduction. Prices will come down as production increases and design changes are made. There are thousands of people in the United States with the desire and ability to buy and operate gas air conditioning equipment. As these people are sold and production increased, prices will come down. The people of more modest means then become interested, the sales volume again goes up and manufacturing, distribution, installation and servicing costs go down. This is a familiar pattern in industry, the automobile and domestic refrigerator being outstanding examples.

Other Systems

In relating this case history of the Servel Gas Air Conditioner it will be recognized that similar patterns and plans are being made by other manufacturers. Some have progressed further than others. Later in the course you will hear about the excellent progress made by the Williams Air-O-Matic Company, the Surface Combustion Company, and others. Each company has made its selection of system and principle of product operation based on company history and policy, and engineering attainment. Fortunately there are available several different types of gas air conditioners. The Williams Air-O-Matic Company has made many installations using a new combination of refrigerant and absorbent compounds in an excellently engineered absorption system. The refrigerant is methylene chloride and the absorbent dimethyl ether of tetrathylene glycol, a combination which has the advantage of operation at practically atmospheric pressure within the sys-

tem. A dehumidifying agent such as lithium chloride is used in a different type of gas air conditioner produced by the Surface Combustion Company. This is known as the Kathabar unit and many large as well as small industrial installations have been made for the purpose of drying air. The air is dried by bringing it into contact with the concentrated salt solution, after which the solution which has absorbed water and become dilute is circulated to a boiler or regenerator and concentrated by gas heat and then returned to the air treatment chamber. An outgrowth of this is the complete air conditioning system in which the air is overdried and water then evaporated in the air stream to produce a cooling effect. A program of residential field testing of this unit is under way, the work being greatly accelerated by experience gained in the Industrial and Commercial fields. The Bryant Company also makes use of direct dehumidification and re-evaporation, with regeneration by gas heat, but employs silica gel as a drying agent. Since the adsorbent material is a solid, an entirely different structure is used. To obtain a continuous drying effect a number of silica gel beds are used in sequence in the larger installations in such a manner as to have some gel always available for drying. Another form adapted to residential use is a cylinder of gel rotated through the different zones of gas treatment; gas heating to drive off the moisture, air cooling of the gel to increase its adsorbtive power, and finally back to the air treatment zone. Evaporation of water into the dry air stream provides the comfort cooling effect. As with the Surface Combustion Company the business growth is based on numerous industrial installations which provides the background for development of the residential and small commercial markets. The Electrodryer Company also employs a solid dehydrating agent in their gas-fired industrial product. Specially prepared aluminum oxide is used in stationary beds.

Competition

All of these and similar products combined with distribution, service, sales promotion, advertising and the myriad functions of business, form the manufacturers' contribution to the gas air conditioning industry. But what about the manufacturer in the electric industry? It would be disconcerting if their evaluation of the potential of the residential and small commercial markets did not parallel the thinking of those interested in the use of gas. There need be no concern on this account, judging from the activity of several large companies in promoting package air conditioners. In addition, there appears on the horizon, also in the field test stage, a new electric competitor in the form of reversed cycle compression machines which use electrical energy to pick up heat from the earth, from well water, or even from the atmosphere, and deliver it to the room at temperatures high enough for comfort heating in the winter. The machine can be used in the normal way to produce a cooling effect in summertime. It is claimed that heating when using electrical energy at 2.0 cents per Kwhr. is equivalent in cost to natural gas at 50 cents per thousand cubic feet. This is important, but there are many other factors to be taken into consideration in making a competitive evaluation, which shows that gas has an advantage. Nevertheless, it is quite apparent that the gas industry must fight for its place in the air conditioning industry. The residential air conditioning plum is not being passed out to any one group on a silver platter.

Utilities' Cooperation

Now let's look at the role of the gas utility in building up the gas air conditioning industry. Increased load at a profitable rate and improved load factor are of prime importance. If this can be accomplished without major capital expenditure, so much the better.

In 1943, a prominent leader in the utility business analyzed the situation in the following words:

"Looking at our own situation and considering all the possibilities of the residential and commercial market for our system, it appears to us to be entirely in the range of accomplishments to look forward to 20,000 installations within a reasonably short period after the equipment is again available to us. That's roughly 10 per cent of our residential and small commercial customers.

"The amount of that revenue flowing from this business after taking out taxes at 15 per cent of gross would represent more than a 50 per cent improvement in the net revenue we now obtain from our entire retail gas business."

In this case it appears that the residential gas consumption of the company was remaining practically constant from year to year. To appreciably increase the revenue by adding new customers requires proportionate capital expenditures. This is necessary in long range programs. For the present and immediate future, new uses for gas in locations already serviced by gas provides the best means for profitable growth. The gas refrigerator has been and is a contributing factor. Gas air conditioning has even greater possibilities for improving the utility load. One all year gas air conditioner residential installation is roughly equivalent to 20 gas refrigerators.

Load Character

A number of estimates have been made of the meaning of gas air conditioning to the gas industry as a whole. It is recognized that there are many ways in which gas has been used in industrial air conditioning. It may be used to produce steam which in turn operates a turbine centrifugal compression machine. It may be used in a gas engine to drive a compressor. Large scale industrial drying is another application. In each case some special economic condition dictates its use. However, we again return to the commercial and residential field. Reasonably accurate information on average gas consumption, winter and summer, based on individual residential and commercial installations, is available but estimates on the new home and existing structure potential market in the next few years vary considerably. A study of existing installations shows that an average seasonal gas consumption for a home user during the summer months is approximately 200 MCF (1000 BTU gas) in the Southern States and 50 MCF in the Northeastern States. Winter heating requirements are roughly inversely proportional. Several published predictions of the annual combined residential and commercial gas air conditioning installations in a stabilized post war year were placed in the neighborhood of 50,000 units. On a basis of 300 MCF per unit when manufactured gas is included in the average gas consumption, the annual increase in gas load would be 15,000,000 MCF. This is roughly 1.8 per cent of the total residential gas usage in the entire United States, and would amount to a very substantial yearly increase. Other estimates made by capable gas industry engineers are even larger. Regardless of some variations it is obvious that the order of magnitude is enormous and of great importance to the gas industry.

Load Leveling

Another important characteristic of the gas air conditioning system is its effect in leveling the gas load. Winter heating has created peak demands which exist for relatively short periods. Production and distribution capacity must take care of these peaks which in turn means idle plant capacity during other times of the year,

particularly summertime. The effect of the summer cooling in building up the summer load and leveling out the demand for gas is obvious. This means increased gas sales for the gas utility without increased capital investment.

One of the major differences between the compressor type summer cooling unit and the gas air conditioner from the utility standpoint is the reluctance on the part of many electric utility companies to build up their residential distribution system to carry the load. Against this the investment has already been made in most cases by the gas utility.

Electric Load Desirable

The electric utility and the combined gas and electric property has a direct interest in all year gas air conditioning because of the uniform electric load due to the ventilation and accessory motors, which operate both summer and winter. The demand in this case is generally within the limits of existing service connections. Comparable electric compression air conditioning systems have the disadvantage to the utility of creating intermittent summer peak loads. Unlike the situation in the gas industry, there is much less likelihood of developing large scale usage of electric heating in the winter to offset the summer cooling load. Therefore, the continuous electric load of the gas air conditioner is welcome to the electric utility.

In addition to these very practical considerations, the gas air conditioner carries with it an element of mystery and glamour which identifies it with the modern concept of research and a new quality of living for the user. This is vitally important to the gas utility in maintaining its competitive position with the electric utility.

Demand for Technicians

In attempting to hit the high spots in this short discussion of the field of gas in air conditioning, it has been impossible to touch on many interesting details which revolve around the study of the users' needs, the development, manufacture and distribution of the product, and the utility interests. I have tried to give you a short story illustrating how the different viewpoints and incentives are correlated to provide the making of a new and great industry, but I have omitted one very important factor which has an effect on the time required to reach this goal and its ultimate attainment, and that is—manpower.

Research laboratories throughout the country have been bemoaning the fact that the inventory of available scientists and engineers has been largely depleted. Our government during the war was notoriously shortsighted in its handling of scientifically trained men and in cutting off the supply of men newly trained in science and engineering. The same shortage situation applies to technicians and apprentices in many trades. To take full advantage of the possibilities of the gas air conditioning business it is mandatory that research and development be continued at an ever accelerating pace and that engineers and technicians be ready to take responsible positions in factories and distributing organizations and that technically trained men become familiar with the process of estimating, air conditioning applications, installation and servicing. The Gas Technology course of which this discussion is a part, constitutes a very constructive step, not only in guiding those who take part in the direction of a promising field of activity, but also in providing the gas industry with men necessary to the realization of the full possibilities of air conditioning by gas.

Presented as part of the Short Course in Gas Technology at Texas College of Arts and Industries, Kingsville, Texas.

REDUCED INVESTMENT
plus
Increased Fuel Efficiency

These are some of the benefits we offer MANUFACTURED GAS plant operators who are faced with the problem of plant replacement, or enlargement, to meet increasing consumer demand.

We have recently established a CONVERSION and STANDBY PLANT ENGINEERING and CONSTRUCTION SERVICE, under the direction of Robert B. Leydig, and a staff of capable assistants, equipped with years of experience in planning, designing, and constructing petroleum and chemical plants of every type.

We invite consideration of your problems, without obligation on your part, confident that our experience in the field of L P-Gas Service and Equipment design and construction, will result in mutual satisfaction and profit.

Engineering Dependability — Designing Superiority

Gas SOUTHERN Systems

Maximum Service — Greatest Efficiency

SOUTHERN GAS & EQUIPMENT CO.

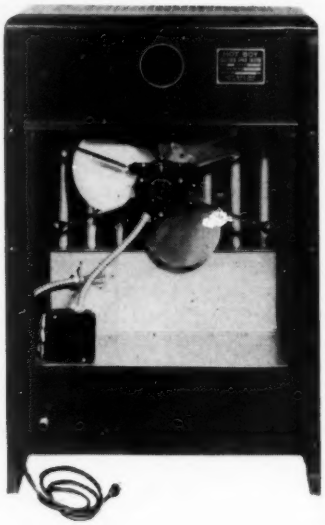
Atco Building TULSA, OKLAHOMA Telephone 4-2448

Branches: Sapulpa and Enid, Okla. — Atlanta, Georgia

SOUTHERN GAS & EQUIPMENT CO. of TEXAS—Houston

HOT BOY

A GAS HEATER FOR HOMES STORES — OFFICES — BUSINESS PLACES



THE *HOT BOY* GIVES YOU THESE VITAL FEATURES

1. CABINET—Heavy steel of bolted construction.

2. HIGH AIR VOLUME DELIVERY FAN—Quiet in operation. Cold air is drawn through a fine screen filter and is forced around the Heat Exchanger tubes for quick heat.

3. HEAT EXCHANGER—Oval Tubular Type transfers heat more rapidly to the circulating air stream.

4. DE LUXE FINISH—Rich brown baked enamel.

5. ACCESS DOOR—Located at side of unit which facilitates inspection, lighting, and service.

6. MOTOR—1/20 H.P.—built for long hour duty and trouble-free operation.

7. BURNER—Accurately drilled—blue flame raised—port type.

8. SUMMER CIRCULATION—Switch is provided for constant fan operation.

9. DOWN-DRAFT DIVERTER.

10. FOR ALL TYPES OF GAS—Available for use with Natural, Manufactured, Mixed and L-P gases.

11. AIR FILTER—Indestructible—fine wire mesh screen—filters dirt and dust—reduces cleaning bills and redecorating expense.

THE *HOT BOY* IS A PRECISION-BUILT PACKAGED UNIT

Soundly engineered in every detail . . . Reflects the highest standards of quality and workmanship throughout

HERE is a low-priced, astoundingly efficient "packaged" heating unit that will supply an abundance of warmth for your home at low cost. HOT BOY is of modern design and styling, finished in rich Cordovan brown enamel. Its smart appearance resembles that of a console radio, and it may be placed in the modern home to advantage.

This singularly outstanding unit will provide uniform warmth and clean, ample heat. Its remarkable efficiency is due to the positive, forced distribution of warm air created by the large sixteen-inch, slow speed-high air volume delivery fan. It has a built-in brazed steel Heat Exchanger of tubular construction which diffuses the heat and directs it evenly throughout the entire space being heated.

The HOT BOY burner produces a clear blue flame and intense heat, which results in fuel-saving.

HOT BOY represents an unequalled value in the heating industry. It is as attractive in appearance as it is outstanding in performance.

HOT BOY is easy to install, being entirely self-contained, can be quickly vented to flue and connected to gas and electric outlet. Installed as easily as a gas range; it may be placed in any convenient location. It will heat from three to five rooms, supplying quick, even, clean, heated air to the entire space in a matter of minutes, quietly and economically.

HOT BOY, INC.

GAS FIRED HEATING UNITS

General Offices: 2021 East 14th Street **Cleveland 15, Ohio**

Large Volume Water Heating

A series of Articles for the Engineer, the Architect, the Salesman and the Contractor. They show how to select and install correct types of Water Heater Systems for specific purposes.

By

Malcolm B. Mackay

The Burkay Company

CHAPTER VII Part I

Water Heating Systems— Their Classification and Functions

BEFORE considering the applicability of each type of water heating installation to various types of service, it is desirable to differentiate between so-called "Domestic" and "Large Volume," or Commercial, hot water requirements.

(a) "Domestic" water heating service is that in which the *peak* hour demand does not exceed 75, or at the most 100 gallons.

(b) "Large volume," Commercial or Industrial water heating service may accordingly be considered as that in which the demand for hot water—*in any single hour*—may *exceed* one hundred gallons.

(c) Using the above as a yardstick we are accordingly in position to properly evaluate the various types of water heaters and water heating systems from the standpoint of ability to supply "Large Volume" hot water demand.

Automatic, Single Unit Storage Water Heaters

(a) Limitations as to Size and Capacity—both recovery and storage—of automatic, Self-contained, Storage Water Heaters except Steam Heated Hot Water Generators as described in detail in Chapter I, confine this type of water heater to the "Domestic" rather than the "Large Volume" water heating field. While steam heated hot water generators are basically of the Self-contained, Single Unit Type, they are not essentially, a "Package Unit" in that they are not completely pre-fabricated before installation. Under the circumstances steam heated hot water generators come within the classification of Recovery Water Heating Systems, the applicability of which will be covered in this chapter, under Booster Water Heaters.

(b) The largest size of conventional Gas or Oil Fired, automatic, self-contained storage water heaters having a storage capacity of 75 gallons might, conceivably, supply a hot water demand for slightly in excess of 100 gallons of hot water during a *single, non-recurring, peak hour* but would be manifestly incapable of supplying hot water at this rate during two, or more, *consecutive* hours of demand at peak rate. (See Chapter *IV*, Part 3.) Under the circumstances the conventional type of gas or oil automatic, under-fired storage heaters should be considered as applicable to "Domestic" water heating and inadequate as to capacity—particularly Storage Volume—for large volume water heating as defined above.

(c) So-called, Big Booster, automatic gas-fired water heaters having a self contained hot water storage tank—usually of the multi-flue type—but having an hourly gas input disproportionately large in proportion to hot water storage capacity may also be classified as storage water heaters. The ratio of recovery to limited hot water storage capacity, however, is such that the actual recovery capacity, only, of this type of water heater may be depended on to supply a peak hot water demand which may continue at the same high level for two or more consecutive hours unless employed in a recovery water heating system with a separate hot water storage tank (See Chapter *IV*, Part 3 on Hot Water Demand and Capacity).

(d) The same limitations, resulting from the arbitrarily established inflexible ratio of recovery to hot water storage capacity of all Multi-Flue type, automatic, large volume water heating units, make it impossible to obtain the variable ratio of recovery to hot water storage capacity necessary to supply peaks of hot water demand which may vary widely with respect to duration of the peak demand period.

(e) Conventional, Electrically Heated, Automatic Storage Water Heaters—even the largest standard size—lack sufficient capacity to supply large volume hot water demand as defined above. This will be apparent from the fact that it would require an automatic, electrically heated water heater having a storage capacity of 60 gallons and an electrical input of 8,000 watts per hour (8 K.W.H.) or a storage capacity of 75 gallons and an electrical input of 5,600 watts per hour (5.6 K.W.H.) to supply *only* 75 gallons of hot water raised 100° F., during a single, non-recurring hour of demand. The relative cost for heating large volumes of water by means of electricity would also be disproportionately high compared to the cost of gas or other fuel as shown in the Comparative Fuel Cost Chart, Figure 11, in Part 2 of Chapter *IV*.

Instantaneous Water Heaters

(a) While an instantaneous water heater may have a rated recovery capacity of 300 gallons of hot water *per hour* when raising the water temperature 60° F., the fact must not be overlooked that it can supply that volume of hot water in a given hour *only* if the hot water is drawn or used *continuously* at a rate of flow of 5 gallons *per minute*. Were it necessary to raise the temperature of the water 100° F., the rate of flow of hot water would necessarily have to be restricted to approximately 3 gallons *per minute* from the same instantaneous water heater. It must be equally apparent that the maximum rate of flow of hot water which would be obtainable from even the largest, commercially available, Gas-Fired instantaneous water heater—having a rated recovery capacity of approximately 8 gallons *per minute*

—would be only 4.8 gallons per minute if called upon to raise the water temperature 100° F. The necessity for restricting the flow of hot water from *any* gas-fired, instantaneous water heater to the rate which will be available based on the number of degrees which the water must be raised in temperature and the fact that the maximum available rate of flow of hot water—particularly if the water temperature must be raised one hundred degrees, or more—will be insufficient to provide a normal flow of hot water from more than 2 faucets simultaneously, reveals clearly that the Instantaneous Type of water heater installation can *not,* except in a very limited field, be successfully employed for large volume water heating.

Employment of the Instantaneous Type of water heater installation for large volume water heating service where the hot water will be required simultaneously from more than *two* outlets will result in a very definite *drop* in the hot water temperature if the flow of hot water is not restricted to the rate—in gallons per minute—which will be available, based on the number of degrees which the water must be raised in temperature. This, in turn, invariably leads to an attempt to increase the water temperature by raising the setting of the thermostat which is doomed to *failure* as the heater is already operating at full, rated capacity.

The instantaneous type of gas-fired water heating installation, therefore, has only a *very limited* range of application in the large volume water heating field as it is difficult to conceive of a hot water demand originating from the hot water requirements for mass housing, mass feeding and —with very few exceptions— industrial processing, being confined to not more than two hot water outlets. To illustrate an exception—an instantaneous type of water heater installation would satisfy a continuous or near continuous industrial processing demand for hot water if required at a rate of flow within its recovery capacity—in gallons per minute—at the required water temperature rise. As it is inevitable that either the temperature would drop below the required level if hot water were drawn at an unrestricted rate of flow or that the restricted rate of flow within the recovery capacity of the heater would be inadequate if hot water were required at a rate exceeding the heater recovery capacity, it is evident that the recovery type of system—which maintains a reserve of stored, hot water—should be employed to supply a large volume water heating demand excepting only in rare instances where it is known that hot water will not—at any time —be required at a rate of flow which may be greater than an instantaneous water heater can maintain.

Booster Water Heaters

Although a Gas-Fired, booster water heater—operating to raise already heated water from an existing source to higher, sterilizing temperatures—is capable of supplying hot water at a greater rate of flow or in greater hourly volume than an instantaneous water heater operating on cold inlet water, the fact must not be overlooked that it is subject to the same operational limitations as is an instantaneous water heater. Since it operates essentially as an instantaneous heater, its recovery capacity must likewise be visualized in terms of the rate of flow of hot water—in gallons *per minute*—which will be available based on the maximum number of degrees F., which the water must be raised in temperature. Also, as in the case of the instantaneous water heater, the potential, *hourly,* recovery capacity will be available *only* if the hot water is drawn or used continuously or near continuously, at a rate of flow which does not exceed its capacity—based on the number of degrees which the water must be raised in temperature. (Refer to Chapter *III.*)

A Gas-Fired Water Heater of the Instantaneous type should *not* be employed as a Booster if—

(a) The hot water will be required at a greater rate of flow—in gallons per minute—than the heater can supply, based on the maximum number of degrees which the water will have to be raised in temperature or—

(b) The temperature of the already heated water supplied to the booster heater by an existing water heating system or other source may —at any time—drop to the extent that the heater could not raise the water temperature the *increased* number of degrees while maintaining the required rate of flow of hot water.

Should either of the above described conditions exist, the heater would be unable to maintain the required hot water temperature at the necessary rate of water flow, or the rate of flow would have to be reduced—perhaps below the required level — to compensate for the increased temperature rise.

In view of the fact that the greatest potential field of application for booster water heater is in supplying the rinse water requirements of commercial, spray type dishwashing machines at temperatures of 180° F., or higher, to comply with increasingly stringent State and Municipal sanitary codes and requirements, consideration must be given to data developed during the conduct of recent, industry sponsored research on the subject of dishwashing and rinsing sanitation and sterilization by the National Sanitation Foundation. The results of these studies seem to indicate that previous, universally accepted concepts as to the rate of flow of 180° F., or higher, rinse water—particularly for the one position, door type dishwashers employing a single rinse only—must necessarily be revised upward if satisfactory elimination of wash solution residue and reduction of dish or utensil surface bacteria count within safe limits are to be accomplished. Although a minimum flow rate of from 5 to 6 gallons *per minute* has, until very recently, been considered adequate for the one position, door type dishwasher employing a single rinse only as noted in Part 1 of Chapter *V,* it now appears that approximately double that rate of flow, or 12 gallons *per minute* must now be considered as the minimum requirements if satisfactory results are to be obtained.

As the majority of spray type dishwashers used and sold are of the One Position, Door Type, it must be recognized that the question of employing an instantaneous type of gas fired water heater—even as a booster —must be influenced by the fact that the largest, commercially available, instantaneous heater would be incapable of supplying the 180° rinse water for this type of washer at a minimum rate of flow of 12 gallons per minute if the water temperature would have to be raised more than 30° F. It would be necessary to maintain a small reserve supply of 180° F. water—sufficient to rinse two or three racks of dishes at a minimum rate of flow of 12 gallons per minute during rinse intervals of approximately 10 seconds duration—and which the heater could replenish in the time intervening between rinses. Means for maintaining this necessary, small reserve of 180° water in conjunction with booster water installations will be described in Chapter *VIII* to follow.

The extent to which we must necessarily revise the hot water demand factors for mechanical dishwashing and for determining over-all and peak hour hot water demand originat-

ing from mass feeding operations as shown in Part 1 of Chapter V, in order that these factors and figures may accurately reflect the necessary upward revision in dishwashing machine hot water demand noted above, will be covered in detail in a supplement at the conclusion of this series of articles.

The advisability of providing means whereby a small, auxiliary reserve of sterilizing temperature water may be maintained for the purpose of enabling now available instantaneous type, gas-fired water heaters, operating as boosters, to supply the rinse water requirements of one-position, Door Type Dishwashers at an adequate rate of flow will be apparent when it is remembered that:

(a) An Instantaneous Type of gas-fired water heater having sufficient recovery capacity to supply the 180 degree rinse water requirement of this type of washer at a minimum flow rate of 12 gallons per minute—when functioning unassisted as a booster to raise the water temperature only 40° F.—would necessarily have a designed *gas input* of 570,000 B.T.U.'s per hour.

The installed cost of such a booster water heater which would function for only 3 or 4 hours of the 24, could scarcely be justified, as it would be idle or non-productive during the remainder of the day. It is also doubtful whether this type of gas load would be considered desirable by the Gas Company as the revenue would be disproportionately small with respect to the increased cost of installing and maintaining the larger gas service lines and meters required to supply such demand.

(b) Maintenance of a temperature of 180° F., for all purposes when only a relatively small portion of the hot water would be required at sterilizing temperature for the final rinsing operation in dishwashers or other specialized requirement, would result in accelerated liming or corrosion of the hot water storage tank and piping, diminished overall efficiency of the entire water heating system and a definite increase in the personal scalding hazard.

The applicability of Recovery Water Heating Systems and of the two temperature, booster-recovery, types of system to large volume water heating will be covered in Part 2 of this Chapter which will follow.

Kohut Now General Manager of C. M. Kemp Mfg. Co.

Announcement is made by The C. M. Kemp Mfg. Co. of Baltimore of the advancement of Frank J. Kohut to the overall post of General Manager. Formerly Sales Manager and chief of development, Kohut will now supervise production, engineering and other internal functions, along with the external. The company is an old line producer of equipment for industrial process heating, gas mixing, atmosphere generation, and moisture control—and has fathered improved techniques of soft-metal melting, textile singeing, nitrogen production, and fuel carburetion.

Lotter Appointed to Research Magic Chef Heavy Duty

As part of the American Stove Company's policy of intensive research in the design and development of cooking appliances of all types, William Lotter has been appointed assistant to A. H. Brodbeck, Director of Research, and will be in charge of research development of Magic Chef heavy duty cooking equipment.

Mr. Lotter was formerly Chief Engineer of the Cleveland division of the American Stove Company. He has been with Magic Chef since 1929 in various capacities at the New Process, Reliable, and Dangler plants.

BREAKFAST OF THE "GAS METERS OF FLORIDA" AT ATLANTIC CITY HONORING THEIR MANUFACTURERS' SECTION

Those present included: Dick Berry, Jacksonville, (General Gas Light Co.); Ted Bergman, Miami, Florida Pr & Lt Co.; B. G. Duncan and Mrs. Duncan, Orlando; Mr. Duncan is President of the Gas Meters; Milton Edwards and Mrs. Edwards, Florida Pr & Light, Lakeland; E. M. Fondersmith, L. J. Mueller Furnace Co., St. Petersburg; John Mooney, Standard Gas Equip't Co., Orlando; Joe Mulcare, New York; C. A. Noda and Mrs. Noda, St. Augustine Gas Co., St. Augustine; J. W. Owen, Secretary Gas Meters Assn., Winter Haven; L. L. Peters, American Stove Co., Atlanta, Ga.; Dave Sharpe, Roper Corp., Atlanta, Ga.; A. H. Stack and Mrs. Stack, Tampa Gas Co., Tampa; F. B. Surguine Jr. and Mrs. Surguine, Orlando; Frank Toney, Combustion Engineering Co., Charlotte, N. Car.; R. B. Wagner, Central Florida Gas Corp., Winter Haven; Cal Williams, Mooney-Williams Associates, Orlando; I. J. Wynn, Gainesville Gas Co., Gainesville.

Exhibit Echoes
of G. A. M. A. Displays at Atlantic City

Photos of these exhibits were received too late for inclusion in the group of exhibitors shown in the November issue of the JOURNAL, pages 43 to 45.

Reynolds Gas Regulator Co. (1) using table displays showed their complete line of high and low pressure regulators, district station, line and toggle type units, relief, back pressure and shut off valves.

Thirteen models of Roper Ranges (2) were displayed, featuring in the center the "$1000 range" equipped with eight top burners and many accessories. This Magic Chef display (3) featured a New Freedom Gas Kitchen; a super-de luxe range equipped with automatic oven clock, griddle burners and glass oven door, the new Vendo low pressure steamer in a Magic Chef, and Heavy Duty Cooking Equipment. Prominently featured throughout was the "CP" seal and its importance to the gas industry.

Norwalk Valve Company (4) exhibited details of Norwalk valves and regulators, filters and gauges, as well as Connelly governors and valves. Specially featured was the Norwalk N-50 Inspirator.

Gas At the National Hotel Exposition

Emblazoned across a one hundred and nine foot backwall, the eye arresting statement that, "Gas Cooks 90% of the 62,000,000 Meals Served Daily in Public Eating Places," was the keynote of the American Gas Association's Combined Commercial Gas Cooking Exhibit at the 31st National Hotel Exposition held at Grand Central Palace, New York City, November 11 to 14, 1946.

A record breaking attendance of over seventy-five thousand buyers crowded the exposition during the four days it was open. They represented not only hotels, but institutions, schools, industrial plants, hospitals, restaurants and dealers in equipment and supplies. The exposition was the largest even staged, and the visitors who thronged the exhibits were seeking items to implement their rehabilitation programs which are expected to total several billion dollars.

The largest single exhibit was the A.G.A. Combined Commercial Gas Cooking Exhibit where eight manufacturers of gas appliances displayed their latest equipment.

The gas cooking equipment manufacturers represented were: Detroit-Michigan Stove Company with a restaurant type and a heavy duty hotel type range; The G. S. Blodgett Co., Inc., had a multiple deck oven; Savory Equipment, Inc., showed their latest models of automatic gas toasters. The American Stove Company with a Magic Chef heavy duty hotel range and a multiple deck oven; Ershler & Krukin, Inc., who showed a stainless steel thermostatically controlled warming table and their newest coffee urn in stainless steel and chrome finish. The Cleveland Range Co. had a stainless steel pressure cooker in their booth section, a Vulcan Sterling range by the Standard Gas Equipment Corp.

J. C. Pitman & Sons Sales Corp. showed their latest models of deep fat fryers in both stainless steel and black finish. ..All the participants in the Combined Exhibit were deluged with inquiries and orders, not to mention requests for deliveries on orders already placed.

It has been estimated as a result of a recent survey that of the gross amount to be expended by hotels on rehabilitation and modernization, about $400,000,000 will be spent for cooking appliances.

you can *Always* depend upon

UNIVERSAL GAS RANGES

Universal Gas Ranges Given Away Free on the Air!
Tune in "Give and Take", C.B.S., Saturdays, 11:30 A.M., E.S.T.

Christmas 1946—and the desire for UNIVERSAL GAS RANGES is greater than ever before! And no wonder—for the sparkling 1946 models are the result of 75 years of CRIBBEN & SEXTON experience in range manufacturing leadership.

With UNIVERSAL, the preferred range, and GAS, the preferred cooking fuel, plus UNIVERSAL'S effective merchandising plans—it's Merry Christmas news that tomorrow's modern kitchens will be served with the modern, accepted fuel—GAS.

GAS *The Preferred Cooking Fuel*

UNIVERSAL *The Preferred Gas Range*

CRIBBEN & SEXTON
UNIVERSAL *Gas* RANGE
700 N. SACRAMENTO BLVD. • CHICAGO 12, ILLINOIS

Program of Change-Over in Suburban Washington

Conversion to Natural Gas Successful As Dealers, Manufacturers and Citizens Cooperate

By
M. O. Waugh

AFFECTING 1600 Virginia and Maryland appliance dealers, and 250 manufacturers of ranges, refrigerators, automatic water heaters and furnaces—is the current change-over from mixed to natural gas in the suburban area of Washington, D. C. Breakdown figures of the Washington Gas Light Co., sponsoring the change, show 40,000 ranges, 8000 refrigerators, 18,000 heaters, and 1500 furnaces involved in the Virginia section; and 25,000 ranges, 5000 refrigerators, 15,000 water heaters, and 6000 heating units, in the Maryland counties adjacent to the "District." If and when permit is granted for similar conversion in the District of Columbia itself, servicing will be needed on 200,000 ranges, 30,000 refrigerators, 70,000 water heaters, and 26,000 furnaces. The City of St. Louis plans to reconvert also, in 1947; and similar projects have been completed recently in Rockford, Illinois, and Nashville, Tenn.

Advance Notice

Prior to actual conversion work in the consumer's home, in the Washington project, a carefully planned public relations program was launched to cover all phases of the gigantic undertaking, as follows:

Manufacturers and dealers received the news in letters which covered conversion requirements in concrete detail. The letter addressed to 250 manufacturers read in part: "If you manufacture a universal type burner which will perform satisfactorily on 600 Btu mixed and on the 1100 Btu natural gas, please deliver all appliances so equipped; if you have available both natural and manufactured gas burners and if you believe that the natural gas burner will perform satisfactorily on 600 Btu mixed gas, please deliver all appliances so equipped; if you have available both natural and manufactured gas burners and if you are uncertain whether your natural and manufactured gas burners will operate satisfactorily on 600 Btu mixed gas, please ship all appliances destined for sale in the Virginia and Maryland areas equipped with natural gas burners, but continue shipping appliances destined for sale in the District of Columbia, equipped with manufactured gas burners until further notice. Regardless of the type of burners which you will supply, supply your distributor with some extra 600 Btu mixed gas orifices and some 1100 Btu natural gas orifices, effectively tagged so that burners will be properly spudded when delivered to the purchaser, and identify all crates and appliances shipped to this area so that natural gas appliances and manufactured gas appliances may be readily distinguished."

Data for Dealers

To 1600 gas appliance dealers went copies of this letter, and also a supplementary letter covering details of the consumer education program which included (1) a letter to the consumer announcing the conversion; (2) a second letter one week before the conversion work began; (3) a hand bill attached to the doorknob, two days before the conversion call; and (4) a visit of the area supervisor for the change-over.

The Washington Gas Light Company, faced with the tremendous physical problem of getting the work done, realized the dangers involved if housewives were not at home when the conversion crew called; and made special effort to get cooperation of the consumer.

The entire territory involved in nearby Virginia, which converted first, was divided into districts averaging 800 customers each. It was proposed that a complete district be converted each day by a crew of approximately 250 men. This meant in the Virginia territory, 39,000 customers in 55 districts, converted in 60 days time.

In addition to letters to the housewife explaining about the properties of natural gas, and how various equipment units should be handled on the day of conversion, the Company made use of a large map, run in each of the Metropolitan newspapers and in each county paper. Large black figures marked each district, numer-

In commemoration of the occasion "Changing Over to Natural Gas" Mr. Everett J. Boothby and Mr. Howard B. Noyes, Vice President and General Manager and General Superintendent, respectively, of the Washington Gas Light Company and Subsidiary Companies, join Mr. John H. Warden and Mr. Henry "Tex" Eddins, President and Job Superintendent, respectively, of Conversion and Surveys, Inc., in posing for an on-the-spot picture. Officials and supervisors in attendance are, left to right: (1) W. K. MacMahon; (2) Henry "Tex" Eddins; (3) A. S. Hall; (4) Everett J. Boothby; (5) D. S. Bittinger; (6) John H. Warden; (7) M. C. Adams; (8) George Ratherdale; (9) R. C. Brehaut; (10) W. W. Gillis; (11) Howard B. Noyes; (12) L. H. Schwartz; (13) Lee Robey; (14) H. H. McMurray; (15) A. W. Johnston, Jr.

ically; and a list of dates showed the householder when each particular section was to be visited.

Employees Primed

For the instruction of gas company employees, 125 possible questions which consumers might ask, were broken down into 35 groups and covered in a running story of the marke with a large numeral; and a operation. Each paragraph was marked with a large numeral; and a cross index, also numbered as to topics, completed the book. A special telephone service was set up to handle inquiries; and for work with the dealers, services of a plumber relations man, a dealer relations man, and of a man to call on builders and do personal follow work, were made available.

Schedules Maintained

Company executives watching the Virginia phase of the project realized happily two facts: (1) although the conversion crew did not start until one day late—the 16th instead of the 15th of August—the schedule with that exception was maintained without a slip through the entire section as mapped; and (2) that the bug-a-boo of "nobody home" did not materialize. Workers returned a minimum of "CGI"—"can't get in" reports. Women who had to be away left their keys with the next door neighbors, or had Cousin Jennie come over and wait for the gas-man. In the Montgomery County area where conversion was scheduled to begin October 15th, the same clock-like functioning of the program was experienced, as manufacturers, dealers, trained conversion men and the consumers cooperated on a well planned and well publicized project.

Information Booklet

Of interest are a number of paragraphs from the information booklet, No. 14 and 15, giving data on mains, says: "It is recognized that natural gas is a dry gas whereas our present mixture of natural and manufactured gas is partially saturated with water vapor when it leaves our plants—the degree of water vapor saturation becomes less and less the farther the gas travels—there may be some tendency for natural gas to dry out old bell and spigot main joints and also the diaphragms in meters and governors. This subject is being investigated and the problems will be met." And from paragraph No. 24: "The fundamentals of appliance servicing remain exactly the same as before. All controls operate in the same manner and service personnel can be quickly trained in proper input, flame appearance and air adjustment."

EXAMPLES OF SAMPLE BILLS

Here is how therm billing works out on 600 Btu gas:

DESCRIPTION	SCH.	SERVICE FROM	SERVICE TO	METER READINGS PRESENT	METER READINGS PREVIOUS	GAS USED 100 CU. FT.	GAS USED THERMS	NET AMOUNT DUE BEFORE DISCOUNT DATE
GAS	A	JULY 1	AUG 1	604	571	33	19.8	3.37

EXPLANATION:
33 Hundred cubic feet of 600 Btu gas used
x .6 Conversion factor for 600 Btu gas
19.8 Therms used

To convert the 600 Btu gas to therms, the factor .6 is used; that is, the number of hundreds of cubic feet used multiplied by .6 reduces the measurement to therms. The reason for the factor .6 is that there are .6 therms in 100 cubic feet of 600 Btu gas.

When 1100 Btu natural gas is being supplied, the factor 1.1 is applied. The reason for the factor 1.1 being used is because there are 1.1 therms in 100 cubic feet of 1100 Btu gas.

Here is how natural gas therm billing will work out on 1100 Btu gas:

DESCRIPTION	SCH.	SERVICE FROM	SERVICE TO	METER READINGS PRESENT	METER READINGS PREVIOUS	GAS USED 100 CU. FT.	GAS USED THERMS	NET AMOUNT DUE BEFORE DISCOUNT DATE
GAS	A	SEP 1	OCT 1	645	627	18	19.8	3.37

EXPLANATION:
18 Hundred cubic feet of 1100 Btu gas used
x1.1 Conversion factor for 1100 Btu gas
19.8 Therms used

It is probable that during the changeover from mixed gas to natural gas you will use both types of fuel during one month, namely, the month during which the changeover is effected in your neighborhood. In that event you will receive a bill which shows the 600 Btu gas and the 1100 Btu gas used, both converted to therms. **Here is how therm billing will be worked out for such a bill:**

DESCRIPTION	SCH.	SERVICE FROM	SERVICE TO	METER READINGS PRESENT	METER READINGS PREVIOUS	GAS USED 100 CU. FT.	GAS USED THERMS	NET AMOUNT DUE BEFORE DISCOUNT DATE
GAS	A	AUG 1	AUG 11	615	604	11	6.6	
		AUG 11	SEP 1	627	615	12	13.2	
							19.8	3.37

EXPLANATION:
11 Hundred cubic feet of 600 Btu gas used
x .6 Conversion factor for 600 Btu gas
6.6 Therms used 6.6
12 Hundred cubic feet of 1100 Btu gas used
x1.1 Conversion factor for 1100 Btu gas
13.2 Therms used 13.2
TOTAL THERMS USED..... 19.8

NOTE: *The above examples were chosen only to show the application of therm billing over a period of three months where the same amounts of gas service is used each month.*

Provision has been made so that if the heat content of the natural gas should vary as much as 15 Btu's from the 1100 Btu average during any one month, the conversion factor will be adjusted. In all probability the conversion factor will not vary from month to month, but if it does you will be billed only for the actual heating service you use.

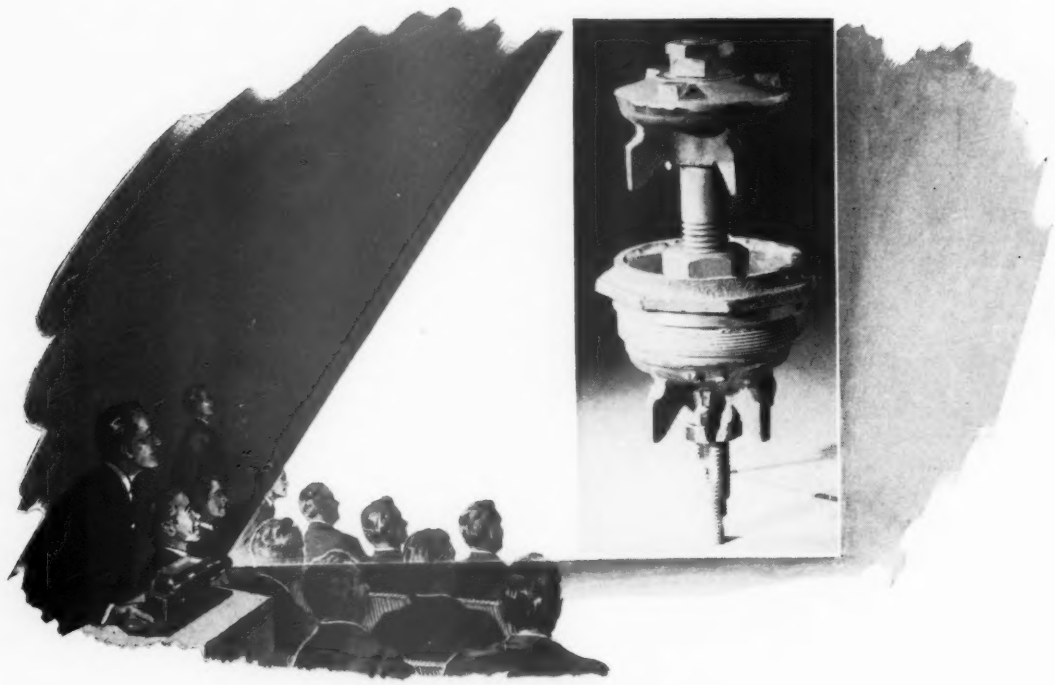
Rates and conversion factors will be shown on the back of each bill.

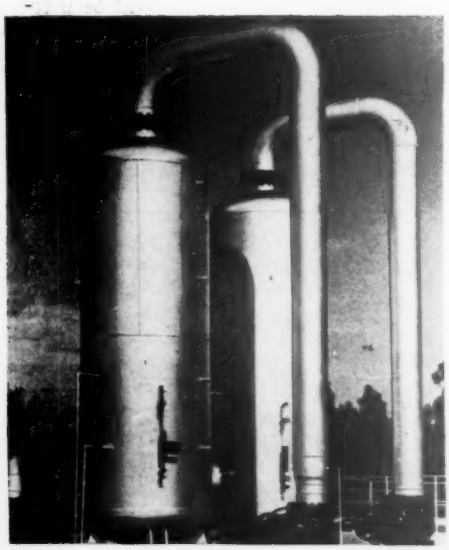
For further information call CHestnut 8000 or ALexandria 2860.

CRUSE-KEMPER COMPANY
AMBLER, PENNA.
GAS HOLDERS
Low Pressure High Pressure Inspection
Purifiers Tanks Flues
Over 40 Years of Sound
Steel Plate Construction

CLEAN GAS

insures uniform pressure regulation





Seven Blaw-Knox plants have been awarded the Army-Navy "E", and have regularly received renewal stars for continued high achievement in the production of war material.

GAS MAIN DUST cuts valve surfaces, enlarges calibrated apertures, and destroys close-fitting adjustments, causing metering troubles and constant repairs. BLAW-KNOX GAS CLEANERS stop this wear and tear. Send for the records. Ask for Catalogue 1869.

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INQUIRIES ARE INVITED

Obtaining the Most for the Meter Repair Dollar

By

Hugh M. Blain, Jr.

New Orleans Public Service Inc.

THE general subject of meter repairing and all of its various phases has always been of vital importance to every gas company, both large and small. It has become particularly significant at this time for several obvious reasons, namely: —(1) New meters have become somewhat of a rarety and the immediate future for them looks dark; (2) During the war, our meter shops have become depleted of skilled personnel to a great extent; (3) In most cases, our periodic change programs have necessarily veered from the standards set up originally; (4) Research and development work in this field has been at a standstill for the past several years.

Now that the war is over and our younger men are returning, we all face the problem of rebuilding our forces and catching up, so to speak, with the deferred maintenance of meters that has been forced upon us. However, before this or any other successful meter repair program can be carried out, a definite general plan must be adopted and adhered to for best results in obtaining the most for the meter repair dollar. Such a plan depends upon certain pertinent practices which I will endeavor to outline and briefly discuss in the ensuing paper.

Meters History and Operational Records

Complete history records and operational reports are necessary to permit the control of the periodic repair policy and the long range planning of future repair programs. Regardless of the types of records used by various companies, the following information is required in one form or another in the accurate execution of a complete program.

1. *Meter history card* — This should have complete identification data of the meter as badge numbers, style and size. The meter history information should include all dates of test and repair data from the time the meter is purchased to the time it is condemned. A further refinement includes the set and remove data as well as addresses of the various locations the meter was in service during its useful life. These cards are generally filed by meter number.

2. *Proof of incoming meters by year of last repair and by size and type*—Condition of proof of incoming meters by year of last repair gives an overall indication of the proof condition of all meters in the field by sizes and types.

3. *Proof of incoming meters by year and nature of last repair*—This report gives information for determining the soundness of past policy used for meter repair and an indication of what future meter repair policies might be.

4. *Proof of incoming meters by causes for removal*—This report gives proofs of incoming meters by year of last repair and segregated as to the following causes: *Removes:*—meters normally removed for nonuse. This information helps bear out the soundness of present repair practice by giving proofs of meters out for varying periods of time up to the full P.S.T. period. *Cause Meters:*—Meters removed for a small defect or leak or any other cause of failure. This information is for a class of meter that is in the minority and is included mostly to complete the picture of all incoming meters tested by cause for removal. *Periodic Shop Test Meters:*—Meters that have served the planned period of service. This information is important to help determine the period a meter is to remain in the field from the standpoint of economy and correctness of proof.

5. *Summary of proofs of meters tested by year of purchase*—This record is used by some companies and is important only when used as a basis to condemn meters of certain age and type as a group. After a sound condemning practice is developed this report loses value.

6. *Summary of meter tests by causes for removal*—This report elaborates on the types of causes bulked as "Cause Meters" in the report described in section 4. A study of these causes indicates that some are not controllable as: Glass broken, Badge off, Waterlog meters, Request of consumer, Damaged, Destroyed by fire, etc. Other of these causes can be eliminated or minimized as follows: Miscellaneous Leakage, Rusty Meters, Don't Register on Slow Light, etc.

7. *Individual Time and Production Card*—This daily record for each man in the repair shop shows hours worked, rate of pay, number and type of meters repaired, and type of repair. This data serves not only as a check on individual production but is valuable in working up unit costs on various repair operations.

8. *Unit cost analysis by type of repair and sizes*—These cost analyses should be made at least once a year for intelligent control and future betterment of each repair job. They also serve a dual purpose inasmuch as they are necessary when making the budget for the coming year.

Smaller companies may not feel a need for some of the more detailed records and history just outlined, however, if the magnitude of a company's meter repairs is great enough, such records will pay dividends over a period of years.

Planning and Coordination of Yearly Change Program

A definite meter change program should be set up determined from your own company's records and experiences or developed through a cross section of other companies' policies, or perhaps both. This has generally been done in the past for both repaired meters reset in the field and new meters purchased from the factory.

To develop such a plan and retain its systematic operation, it becomes necessary to evolve a system of cross filing to keep track of all the meters in the history file as to the year they are due back in the shop for periodic shop tests. This can be done by creating a file of small cards on each of which the meter number and the size is given. These cards are generally filed on a year month basis. By a method of rotation and as the months and years

pass, the cards are dropped back in the file when necessary until they are taken out after serving the predetermined old age period.

Through the use of such a filing system, the management can easily determine the number and size of meters due in the shop for the periodic shop inspection and repairs and can control the time of year to change such meters and secure close routing with the minimum of effort.

Meter Shop Flow Diagrams by Types of Repairs

To gain the greatest production for the lowest cost, both tin and iron case meters should pass through the repair shop according to a workable flow diagram by various types of repairs and system of repairing. Again, the flow diagram the meters follow may be of your own design suitable to your local conditions or it may be patterned after other companies. The important thing is to have a definite plan of testing and repairing each meter as it enters the shop.

Due mainly to varying local conditions, particularly the number of meters in the property, meter repair operations are not standard over the country. The methods vary from a complete stripping and rebuild by one man to an extreme breakdown in unit repair operations. However, there has been a marked tendency in the industry for gas companies to study the methods of other properties which has resulted in a large amount of simplification and standardization of methods and materials.

The type of repair a meter will follow through the shop should be determined by a careful study of performance records from which the various repair flow procedures are then standardized. Aided by certain standards practiced by the company and actual internal inspection of each meter, the responsibility of designating the type of repair rests upon the shoulders of an inspector or foreman.

The flow diagram is also extremely helpful in the training of new meter shop employees as we will see later.

Training and Use of Personnel

The importance of selecting and training new men for shop work cannot be overemphasized. First, every endeavor should be made by the management to select new employees possessed with some mechanical ability and not adverse to steady shop work. His induction training should be complete through the Employment Division, General Superintendent's Office, and so on down the line to the Meter Shop Foreman.

His job training for the meter shop should consist of a planned course beginning in the classroom. If the cardinal rules of the standard Job Instruction and Job Method Training are used throughout, the new employee will have been given every opportunity and will produce results quickly.

In adapting the use of personnel to a particular shop operational flow diagram, there results a large number of solutions depending upon the size of the meter shop. As stated, this can vary from each of the men completely repairing the meter assigned to him or to a system where each man performs an operation in a production line method of repair. If the first of these methods is adopted, it is apparent that practically all of the shop personnel will have to be full-fledged meter repairers. This is probably the case in the smaller company.

The second method or that involving a production line of operation seems to be more adaptable to the larger shops. This presents the distinct advantage of training a man for one particular operation and the utilization of the shop personnel in the jobs for which they are best suited.

The best program to adopt is usually apparent to the company after a study and analysis of all local conditions has been made.

Use of Proper Tools, Equipment, and Materials

Specialized tools and equipment in the meter shop are essential to accurate workmanship and maximum production. Each man should have the proper tools for his own use for his particular repairing operation and should be taught from the outset how to use them to fullest advantage.

Some of these small tools would include special wrenches, proper weighted soldering coppers, packing hooks, stripping knives, special combination caps for meter rates, tools and jigs for adjusting tangents, and jigs to assist in the fitting and building up of certain type meters.

There is also room for much specialized equipment in the up-to-date meter shop. Outstanding equipment used on the operations as designated has more than paid for itself in our meter shop as well as in many others.

Intesting & Outtesting—Tables for quick connection of meters, proper lighting and convenient bench for writing up test results. Sufficient prover capacities for testing small meters and special carts to move meters safely and efficiently. Constant temperature testing rooms.

Stripping—Improved stripping benches equipped with hoods and exhaust fans.

Washing—Automatic controlled hot dip tanks with rinse tanks located for minimum handling of meters from one tank to another.

SUPERIOR GAS METERS
For Sound Values and Continuous Operating Economy
Meters for Domestic and Industrial Use. All Sizes 5B to 60C.
Wet Test and Demonstration Meters — Diaphragms —
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Diaphragm Oiling — Automatic level and temperature controlled oiling tank for the oiling of diaphragms by immersion. Overhead rail with chain hoist for handling large meters.

Large Valve Grinding — Large power driven rotary steel plate considerably speeds up the grinding of large meter valves.

Leak Testing—Use of test rack for holding number of meters for high pressure external leakage test. Internal leakage test is conducted by the use of a slope or draft gauge for four points on the meter cycle.

Exercising of Meters—Approximately two hundred cubic feet of air is passed through each meter prior to adjusting in order to permit the meter to obtain a balanced condition before adjusting.

Topping — Use of special dipping and testing tank for quick determination of leakage. Jig for holding meters at different positions for topping.

Painting—The use of a paint booth for spray painting of meters with exhaust fan is practical and efficient for rapid painting of meters. Our experience has proven to us that a two coat job consisting of a primer and top coat withstands the elements successfully over our normal change period.

Stocking—Proper shelving in a dry storeroom for new and repaired meters.

Material Availability and Usage

When possible, sufficient stocks of all materials used in the meter shop should be available. Costly interruptions may be avoided in the meter repair program if the right materials and parts are always accessible.

Standardized materials should be developed and used which best meet your local problems. It has been proven that merely switching from one kind of material to another without a trial period of testing, weighing of costs, etc., is not good business in the operation of a meter shop. This does not mean that materials should never be changed, on the contrary, the management should be ever alert to systematic research work for better materials.

Safety in the Meter Shop

Just as in any construction or maintenance operation, safety plays an important role in meter shop work. Workmen should be furnished gloves, spectacle goggles, aprons, and any other protective equipment necessary to safely handle soldering copper, hot solder, etc. The foreman should insist that the men use these protective devices at all times. A meter shop with a good safety record is generally a healthy one in more ways than one.

Sizing and Protection of Meters in Field

The proper sizing of meters to be set in the field has a direct bearing on the life of a meter and its repair history and the ultimate capital investment.

Depending upon local conditions and whenever possible, it is wise to set meters in those locations which will afford some protection to them.

Research and Development

There are many meter repair problems that can be solved only by close study and experimentation. The answer to these problems is not always apparent after study of meter records. Some are of a nature which indicate that special attention and research are necessary.

The development of special shop equipment is the outcome of studies made for the determination of better methods for each specific operation in the shop.

The foreman who is responsible and kept busy with meter shop production is not always the best man to carry on the research and development program. Frankly, he is too busy and too close to do justice to this type of work. If practical, a young engineer after thorough training and familiarizing himself with meter shop practices, should be allowed to live with these problems and carry on research for the continued betterment in the art of getting the most from our meters.

Conclusion

In closing, to obtain the most for the meter repair dollar, practical consideration and study may be given to the foregoing basic principles and practices in order that meter maintenance costs will be held to a minimum for good practical performance over the desired period.

Presented at Convention of Southern Gas Association, Galveston, Tex., March 21-22, 1946.

STAMANCO
Sign of ENGINEERING EXCELLENCE

The trade name "STAMANCO" stands for specialized experience . . . leadership in design . . . and finest quality workmanship. In fact, it epitomizes all those desirable characteristics that make for the highest degree of economy and satisfactory operation in gas holders, hi-pressure tanks, and purifiers. Photo at right shows an example of "STAMANCO" engineering excellence--one of our 750,000 cubic foot Wet Seal Gas Holders recently installed at Pittsfield, Mass. This is the FIRST All-Welded Gas Holder permitted to be erected in the State of Massachusetts.

Before you invest in such equipment, it will pay you to talk over your requirements with one of our engineers and get a bid on a "STAMANCO" quality job.

The STACEY SINCE 1851 MANUFACTURING Co.
CINCINNATI 16, OHIO
GAS HOLDERS • HI-PRESSURE TANKS • PURIFIER BOXES
ENGINEERS • FABRICATORS • CONSTRUCTORS
An Independent Organization Not Affiliated With Any Other Builders of Gas Holders

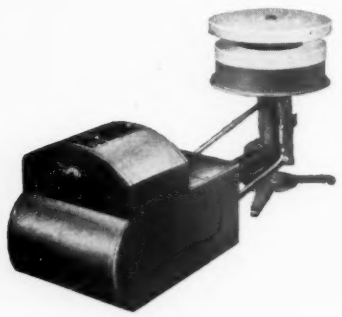
New Equipment

CONVERSION BURNERS

Of the many types of conversion burners now available, there are upwards of 40 among the listed accessories certified under American Standards by A.G.A. Some of these are briefly described and illustrated. Full details may be had by writing the manufacturers.

Roberts-Gordon

Several types for home and commercial heating are made by Roberts-Gordon Appliance Corp., Buffalo, N. Y. Shown here is Series 84.

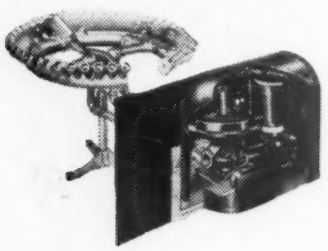


Used to convert any round coal-burning furnace or boiler with grate diameter from 13" to 36" or any rectangular boiler with grate dimensions from 13" to 45". Three models, with capacities from 210,000 to 500,000 B.T.U. per hour.

Burner produces a mushroom flame, is equipped with telescoping mixer, automatic pilot and iris orifice. Adjustable to any kind of gas with no major change of parts.

Columbia Nutipe

Model P-ZE pictured below is designed for use in warm air furnaces or in round type boilers where the grates are removed.

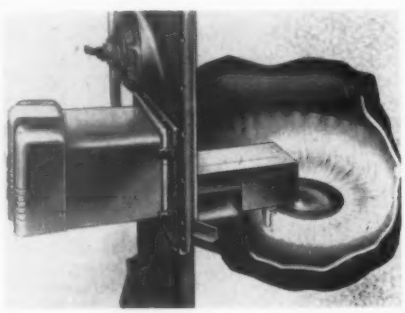


This type Burner has many exclusive and patented features such as Air-Cooled Safety Pilot, foolproof controls and Vacuum Cup Jets which permit the burner to operate on low or high pressures without fear of the flame leaving the ends of the ports. Another important feature of this Burner when used in warm air furnaces is the fact that it does not fire directly in front of the coal feed door where the greatest amount of heat loss to the cellar is normally experienced, the flame being impinged against the firepot wall at the point where the greatest amount of heat transfer takes place. This insures quicker heat transfer, earlier delivery of heat to rooms and a greater overall effectiveness in heating homes.

Made by The Columbia Burner Company, Toledo 7, Ohio.

Handley-Brown

A new Fuel Door Conversion Burner, designed so that one model will handle the gas heating requirements of 90% of all houses—both large and small—is offered by Handley-Brown Heater Co., Jackson, Michigan. A simple adjustment on this model varies the input from 50,000 BTU's to 200,000 BTU's. It is adaptable to both furnaces and boilers, eliminates the necessity of removing the grates, and avoids other change-over expense.



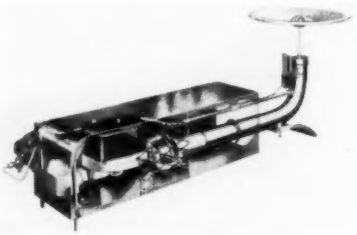
The burner head causes the hot gases to travel the side walls from the bottom up. This scrubbing of the side walls delivers a maximum amount of heat through the fire box walls without heating the front of the heating plant.

Attractive styling and simplicity of the unit make it especially desirable for modern basements.

Norman Burner

The Norman conversion gas burner is a postwar design with a single-port, self-piloting, flame retention type principle. Construction is of durable heavy-gauge, prime-rolled sheet steel, die-formed and electrically welded. The air door is located on the side of the burner to eliminate any possible blocking of air supply to the burner. Adjustments may be made externally without removing end cover.

One size and type Norman burner meets most domestic heating plant requirements. Two sizes cover the entire range from 50,000 to 300,000 BTU per hour. Telescopic burner



tube, adjustable front legs and rear support, reduce installation time and permit quick leveling of the burner.

Completely assembled and tested at the factory before shipment. All controls are rigidly tested. The entire burner is shipped completely packed in one carton. Made by Norman Products Co., Columbus 8, Ohio.

Barton Burner

Available for immediate delivery is the A.G.A.-approved Barton Conversion Gas Burner whose single size and model is adjustable to fit in most domestic type heating plants.

It is precision engineered, having exclusive innovations enabling it to deliver high heating efficiency, even temperature and dependable, economical operation. The wall-flame type burner with spreader-baffle directing flames to sidewalls

and Appliances

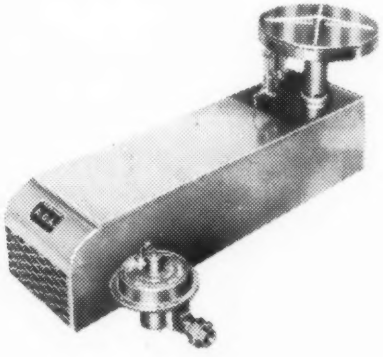
ussures its adaptability to heating plants of varying firepot sizes. Input, natural gas 200 M. BTU, manufactured, 155 M.

The sturdy, enamel finish steel burner housing protects all working parts, including gas valves, controls and gas pressure regulator. The burner is completely enclosed, so that control settings cannot be disturbed accidentally.

Preassembled at the factory, it insures time saving installations on each conversion. By removing the burner cover, every part is easily accessible, and the entire mechanism can be removed and replaced quickly, without disturbing the installation. Made by The Barton Company, 64 Glenwood Avenue, Minneapolis, Minn.

Silver Flame

In this unit, made by Silver Flame Inc., Detroit 4, Michigan, the gas valve is automatically sealed



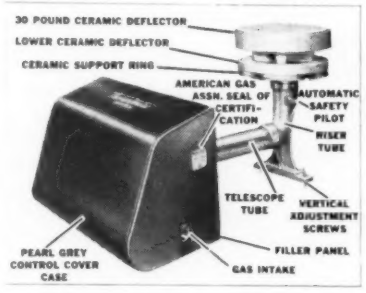
if pilot light fails. The valve is controlled by room thermostat. Gas pressure is automatically adjusted and regulated to maintain efficient flame. A certified burner with non-corroding bronze head operates on all gases. Delivered complete with all controls.

Thermomatic

The Thermomatic Gas Conversion Burner manufactured by The Willoughby Machine and Tool Company of Willoughby, Ohio, offers the following features:

A 30 pound ceramic deflector is designed to withstand temperatures up to 3,100°F. It is designed to mix secondary air with the flame, to create a smooth flame of high efficiency.

Fits most furnaces or boilers, ranges from 70,000 to 235,000 B.t.u.; controlled secondary air. Every-

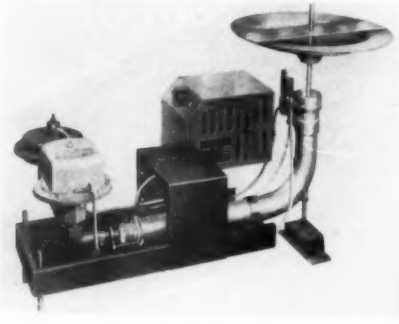


thing is protected and covered by the control cover case. The Thermomatic unit weighs 80 pounds and is ruggedly constructed for durability and trouble-free service.

"Blue Flame" Burner

The Blue Flame conversion type gas burner features compactness of design, ease of installation and high heating efficiency.

Venturi tube with scientifically designed taper allows maximum efficiency of air entrainment and mixture with gas. Sliding shutter inside venturi controls primary air. Total air enters through adjustable sliding shutters in burner cover, shown in background of illustration.



Burner head of stainless steel is flexible with regard to rates of gas flow and types of gas. Pilot is quick-acting and self-compensating. Made by Consolidated Industries Inc., Lafayette, Ind.

Budco Burner

Marketed under the trade name "Budco" this burner is made by Budco Inc., Detroit 5, Mich.

The burner is made of durable cast iron, equipped with the best makes of nationally-known controls and is easily installed without cementing, welding or bricking-in.

It is unique in design as used with natural gas, in that the necessary turbulence and best distribution of gas and air is vented inside the burner itself. The gas and air after being taken into the venturi is turbulated in a special-designed mixing chamber and after being inducted through the nipples, is given additional turbulence in each of the individual heads by means of projections and slots designed therein. This internal turbulence provides the optimo in distribution of gas and air to create the maximum heat at the burner head with the minimum use of the natural gas.

Gas Fired Boilers

Specially designed for hot water heating systems, "Hydrotherm" units made by Hook & Ackerman, New York 17, N. Y. offer a compact central gas heating plant of unusual design and construction.

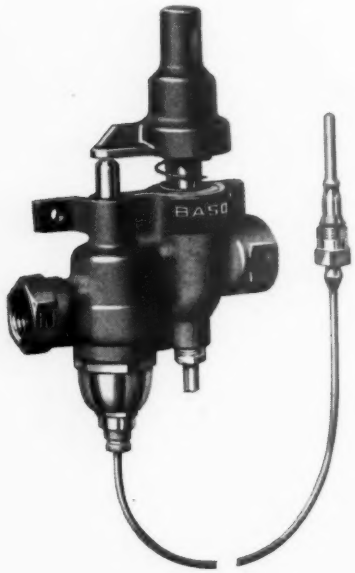
Shown in the illustration with insulated jacket removed, is a unit for 400 sq. ft. of installed radiation occupying floor space 18 by 27 inches, 100M Btu input. Automatic in regulation. A staggered connection of sections creates a positive circulating force without the use of circulators.

In addition to single homes these units are adaptable for multi-family dwellings and apartment buildings. May be installed in kitchen or utility room, or a bank arranged in the basement with separate control to each apartment. Full details with ratings available.

New Equipment and Appliances

Floor Furnace Valve

Simplicity of operation distinguishes the new No. 831 Baso for floor furnaces, a product of the Milwaukee Gas Specialty Company. Only a single control rod is necessary to attain the three operating positions.



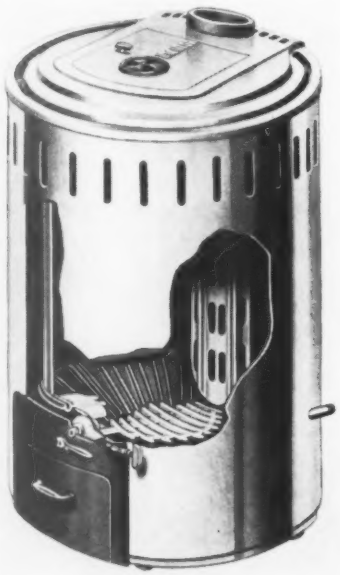
The unit consists of a thermocouple assembly and an electromagnet housed in the hood assembly. The #80 thermocouple lead includes the thermocouple and two current conductors, one a copper tube surrounding an insulated inner one. The hot junction of the thermocouple lies in the pilot flame and, by a temperature differential between itself and the cold junctions, generates electricity to energize the electromagnet and hold the valve open.

The plug valve serves as both main burner and pilot valve. It turns through only 180° from the "Pilot" position to the "Off" position and throttling is accomplished between the "Pilot" and "On" positions. When the automatic shut-off valve is open, gas flows to the main and pilot burners through the port drillings of the plug valve with the handle in the "On" position. In the "Pilot" position gas can flow only to the pilot burner. Gas is cut off from both burners with the valve in the "Off" position.

The reset assembly provides the means of placing the valve in operation. With the stem connector turned to the "Pilot" position and depressed, a lug on the connector engages the reset button and forces it down to push the valve off its seat. Gas can then flow to the pilot burner only.

GAS FIRED INCINERATORS
"Incinor"

The "Incinor," a disposal unit for rubbish and table waste employs a special torch type burner to produce high velocity of air for maximum combustion, with down draft burning.

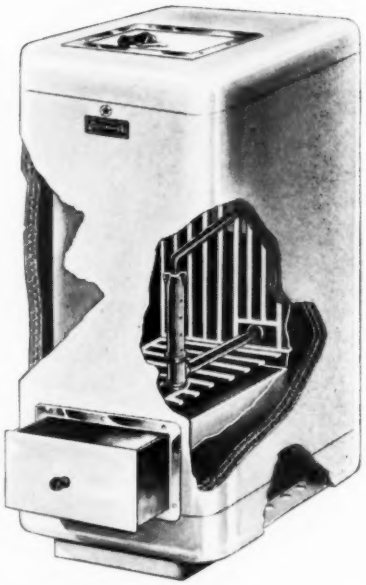


Cut-away view shows standard model made in 2 or 3 bushel capacity, normally located in basement near chimney. Half inch gas connection shown on right. Grate combines shaking and dumping features with ash pan below.

Full details from manufacturer, Bowser Co., Incinerator Division, Milwaukee 4, Wis.

"Calcinator"

The "Calcinator," shown in cut-away view is a disposal unit designed for placement in kitchen or basement. Combustion chamber is of acid-proof steel. Burner is shielded for protection from refuse. Complete combustion of all refuse is claimed with smoke-proof odor-



less operation. Unit is thoroughly insulated and has white enamel finish.

Complete information from the manufacturers, Valley Welding & Boiler Co., Bay City, Michigan.

Pyrojet Conversion Burner

This unit marketed by I. & M. Sufrin, Pittsburgh 3, Pa., is made in two models, AB-175, 175,000 Btu for homes up to 6 rooms and AB-220,

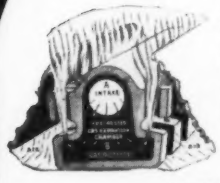
220,000 Btu for larger homes. Slides into ash pit door. Has thermostat and safety controls. Specially designed deflector plates of burner convert ordinary flame into one of high radiance. Controls all housed in heavy gauge, rust resisting steel. Bell, throat, shutter plates and burner orifice are of copper and bronze.

COLUMBIA LITTLE GEM GAS BURNER

For Liquified Petroleum Gas

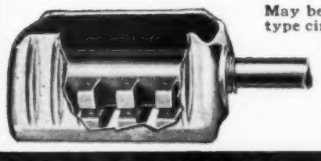
Immediate Delivery

Also Adaptable for Natural or Manufactured Gas



Just the burner for present day conversion. You can handle any job, domestic or commercial, with Little Gem. Easy to install. Minimum service required. Gives complete combustion without pre-mixing.

MULTIPLE UNIT BURNER



May be hooked up in series to fit any type circulating heater, steam tables, enameling ovens, galvanizing tanks and many other applications. Write for circular.

See the Complete Line at the **Cleveland Exhibition**

THE COLUMBIA BURNER CO.
729 Ewing Street · Toledo 7, Ohio

THE INLAND DOOR CLOSER

DESIGNED for CONVERSION BURNERS

OVER **50,000** *IN USE*

This device, designed for conversion burners, automatically closes the fire door of a boiler or furnace when blown open.

It consists of a cadmium plated door hinge pin, spring and wedge. The hinge pin replaces the regular fire door pins, the spring furnishes the motive power and the slotted wedge holds the fire door in the open position when required.

Furnished in 3/16 — ¼ — 5/16 — ⅜" Sizes

INLAND MANUFACTURING CO.
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Reynolds

for Gas Control

FOR OVER FIFTY YEARS, Reynolds Gas Regulators have proven their ability in a field outstanding for its rigid requirements.

Proper regulation at the station; in the line; in industrial plants; in the home—for every kind and type pressure control equipment used in the gas industry, there is an especially designed product by Reynolds. Right down the line! From High Pressure to Low Pressure, from one ton to inches W. C., on big jobs or little jobs, one of the Regulators listed below will do a better job on your gas control.

REYNOLDS PRODUCTS

High Pressure Service House Regulators
Straight Lever Type—Model 10-20 Series.
Toggle Lever Type—Model 30 Series.

Low Pressure Service or Appliance Regulators

District Station Regulators
Single or Double Valve, Auxiliary Bowl and Automatic Loading Device Optional.

High Pressure Line Regulators
Pilot Loaded—Pilot Controlled

Toggle Type Regulators
Single Valve, Double Valve, Triple Outlet.

Seals: Dead Weight or Mercury

Relief Valves: High or Low Pressure

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Automatic Quick-Closing, Anti-Vacuum Valves.

Automatic Shut-off Valves • Vacuum Regulators
Lever Operated Valves • Louver Operated Device
Atmospheric Regulators

GAS CONTROL SINCE 1892

REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.

RECENT COURT DECISIONS
Affecting Gas Utilities

Liabilities Arise During Transportation

By
Leo T. Parker
Attorney at Law
Cincinnati, Ohio

IT IS NOT infrequently that legal controversies arise when merchandise and equipment pertaining to the gas industry is damaged, lost or destroyed during its transportation. The law on this subject is simple.

Any one who files this article for *future* reference may quickly and conveniently determine with absolute certainty whether the carrier is legally responsible in damages.

Kinds of Carriers

There are only two legally classified carriers, namely common and private. It is certain that there is a vast "distinction" between the liability of these two kinds of carriers.

It is important to know that a common carrier is practically an insurer of the safe arrival of shipped goods which it accepts for transportation. A common carrier is liable for *all* loss, except such as may be caused by (1) the act of God; or (2) a public enemy of the United States; or (3) the fault of the shipper; or (4) the inherent nature of the goods.

The courts have defined an act of God to be "an irresistible physical force which is not perceptable by ordinary or extraordinary human foresight, care or indulgence." Therefore, an act of God may be an extraordinary heavy downpour of rain, an unusual flood, a cyclone, an earthquake, or other similar natural disturbance.

Of course, a common carrier cannot avoid liability for loss or damaged merchandise on the plea that the damage was caused by an act of God, *if* the testimony proves that the carrier could have prevented the damage by using an ordinary degree of care. But if the act of God was the *proximate* cause of the damage the carrier is not liable.

For illustration, in the leading case of Farr v. Union, 106 Fed. (2nd) 437, it was shown that a shipment was damaged by flood waters which *unexpectedly* rose before the common carrier could remove it from the car. The shipper filed suit, but the higher court refused to hold the common carrier liable, and said:

"The test to be applied is not the hindsight test, but the foresight test. The question is: Could the carrier reasonably have anticipated that damage would be caused by such an act of God? . . ."

If the shipper had proved that the carrier had failed to remove the goods from the car because its employes did not use ordinary good judgment in anticipating the flood, the court would have held the carrier liable. This same rule of the law is applicable where goods are lost, injured or destroyed as a result of the inherent nature of the goods. For instance, in a leading case the higher court refused to hold a common carrier liable for destruction of goods by fire when the evidence showed that the fire was caused by a short circuited electric battery, which the shipper failed to properly pack.

Distinction Between Carrier Liability

While, as above explained, a common carrier is liable practically as an insurer of shipped goods, the legal responsibility of a private carrier is much less. Therefore, very frequently it is necessary for owners and officials of municipal plants to determine whether a carrier is a "common" or "private" one.

Legally a common carrier is *any* carrier which holds itself out to the public as being ready to transport goods *for all who demand the service.* However, a private carrier is one who transports goods for *only* selected persons or firms. For example, the owner of a motor-truck whose business is transporting merchandise exclusively for one or a few more shippers is a private carrier.

For example, in Zelle v. Industrial Commission, 65 Pac. (2nd) 1429, it was shown that a truck owner operates a number of motor trucks which serves a list of customers on a contract, but he does *not* haul for the general public.

The legal question arose whether or not the truck operator is a "common carrier." In holding the operator *not* a common carrier, the court said:

"A common carrier serves the general public. . . . The answer is that plaintiff was not so engaged. . . . The truck operator here offered no such program of service—he only served those with whom he had pre-existing contracts. Shortly expressed, he was a 'contract carrier'."

Private Carrier Liability

If a private carrier injures, damages or destroys shipped merchandise it will *not* be held liable *unless* the shipper proves that such damage or loss resulted from lack of ordinary care on the part of the carrier or his employes. In other words, the liability of a warehouseman is exactly the same as that of a private carrier. Thus, both a private carrier and a warehouseman are liable in damages for injury to or loss of shipped equipment *only* if it is proved that the carrier or warehouseman was *negligent* in safeguarding the merchandise whereas, as above explained, a common carrier is practically an insurer of the safe arrival of the merchandise.

For comparison see Cook v. Transfer Company, 13 P. (2nd)

549. Here it was disclosed that a shipment was placed on the motor-truck operated by a private carrier. When the shipment was delivered it was damaged.

The shipper proved that the carrier provided *no* cover on the truck, and that the merchandise had been rained on and therefore damaged. Because of the failure of the carrier to provide a cover the court held that it was negligent, and liable for the damage.

It is important to know that there is no fixed standard in the law by which a court is enabled to definitely decide in every case what conduct of a private carrier is negligent. However, if the testimony shows that the private carrier *failed* to use the degree of care that would have been used by other reasonably careful persons, then it is negligent and, therefore, liable.

Limitation of Liability

Any contract between a shipper and a common carrier, or private carrier which completely exonerates the latter from liability for its *negligence* is void and against public policy. See Benz v. Monarch Transfer & Storage Company, 9 S. W. (2nd) 822. Also, see Hubbard v. Matson Nav. Company, 93 Pac. (2nd) 846, where the legal question was presented the court whether a contract is valid by which a common carrier endeavors to limit its liability, without giving the shipper a lower rate. In holding the carrier not entitled to limit its liability the court said:

"Since complete exoneration clauses in a contract between a common carrier and a shipper are invalid, partial exoneration clauses will only be permitted where the shipper receives a special material benefit in the form of a special low rate in return for his promise to accept limited damages."

Therefore, it is quite apparent that a clause in a bill of lading intended to limit a carrier's liability must be based upon a freight rate *reduced* from the ordinary rate, otherwise there is no valid or legal "consideration" and the contract is void.

Other Agreements Void

In fact any agreement contrary to the ordinary law is void. The law provides that the Interstate Commerce Commission must establish legal interstate freight rates.

See Montpelier v. Caldbec-Cosgrove Corporation, 8 Atl. (2nd) 681, in which a carrier agreed in writing with a shipper to transport an interstate shipment for 42 cents per one hundred pounds. Later the carrier sued the shipper to recover the legal rate covering the specified route which was 66.5 cents.

Although the shipper argued that the common carrier could not compel him to pay a higher freight rate than was specified in the written contract, or bill of lading, the higher court held the shipper bound to pay the legal rate of 66.5 cents per one hundred pounds which was the rate established by the Interstate Commerce Commission. This court stated important law, as follows:

"No contract of the carrier can reduce the amount legally payable, nor can any act or omission of the carrier estop or preclude it from enforcing payment of the full amount by a person liable therefor."

Also, see Brandon v. Lickty, 182 So. 897, where a shipper delivered a lot of merchandise to a transfer company in Iowa to be transported to Florida. Under a written contract the transfer company agreed to transport the goods for a freight rate, which was lower than the rate fixed by the published tariffs of the Interstate Commerce Commission. When the merchandise arrived in Florida the carrier demanded the shipper to pay the rate established by the Interstate Commerce Commission. The higher court held that the shipper was bound to pay the legal rate.

Therefore, a shipper must pay a legal freight rate irrespective of a special contract with the carrier for a reduced rate. Moreover, the carrier is liable if it fails to collect the legal freight rate.

Authority of Commission

Modern higher courts consistently hold that a private carrier is required to obtain a certificate from the State's Public Utilities Commission.

For example, in New Way Company v. Smith, 96 S. W. (2nd) 282, the Public Utilities Commission contended that it could control the method of operating motor trucks operated by public carriers. In upholding this contention, the court said:

"The power of the state to regulate traffic over public highways is well settled. This power includes the right to permit or prohibit motor vehicles, operated for compensation or hire, to use its public highways under such rules and regulations as the legislature may see fit to prescribe. . . ."

Status of Bill of Lading

A bill of lading is both a contract and a receipt. It is a receipt for the goods accepted for transportation, and a contract by the terms of which the carrier agrees to transport the shipment at a stipulated charge.

One of the well settled legal rules, with respect to bills of lading, is that since a bill of lading legally is both a contract and a receipt, either party may introduce evidence to show that there is a mistake in the receipt portion of the bill, but both parties are bound positively by all legal terms of the contract.

For instance, in the leading case of Goodrich v. Norris, 10 Fed. 545, the higher court explained the legal character of a bill of lading in the following language:

"The bill of lading has, in legal effect, a double aspect. It is a contract for the transportation and safe delivery of the property shipped, and it also embodies, as a matter collateral to that contract, a receipt for the goods so shipped. It has no higher obligation than an ordinary receipt."

Another important point of law is that a consignor is liable for payment of freight charges, if for any reason the purchaser or consignee refuses to pay the same, although the bill of lading specifies that the consignee will pay the freight charges.

For illustration, in Moss Company v. Michigan Cent. R. Company, 123 So. 90, it was disclosed that a shipper named Moss shipped to a purchaser a carload of merchandise "charges collect." The railroad company was unable to collect the charges from the consignee and the court held the consignor liable.

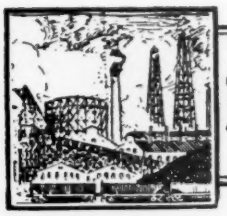
Universal Gas Ranges On the Air

Two great radio programs are featuring Universal Gas Ranges as the outstanding prize on their nation-wide hook-up.

First of these shows is "Give and Take," a fast moving 30-minute, quiz-type program starring John Reed King as master of ceremonies. It is broadcast coast-to-coast every Saturday at 11:30 A.M. E.S.T. over the entire Columbia Network of 147 stations.

The other major CBS program featuring Universal Gas Ranges is "Surprise Party," broadcast every Tuesday and Thursday at 4:30 P.M. E.S.T. from Hollywood. This is also an audience participation program and is called "the most surprising show on the air."

Cribben and Sexton Company have arranged for the winning contestant's dealer to make the presentation and installation of the range. In this way, local as well as national publicity is obtained and the dealer is identified as the outlet for these ranges in the community.



News of the Gas Industry

Eastern Natural Gas Regional Sales Conference

As the forerunner of a full prewar schedule of regional gas sales conferences covering the residential field, the Eastern Natural Gas Regional Sales Conference, sponsored by the Residential Gas Section of the American Gas Association, will be held February 13-14, 1947, at the Roosevelt Hotel, Pittsburgh, Pa.

Plans for the conference were perfected at a meeting of the Eastern Natural Gas Regional Sales council in Pittsburgh, November 8, at which C. S. Stackpole, Baltimore, vice-chairman of the Section, presided. F. B. Jones, manager of sales and market research, Equitable Gas Company, Pittsburgh, was elected chairman of the council and is in charge of conference arrangements.

The tentative program calls for addresses by key executives on various promotional phases of automatic gas cooking, water heating, house heating and refrigeration. Other timely topics will include presentations on national advertising, home service, appliance financing, house to house selling technique, and a market analysis by a national public opinion sampling expert. A survey of the industry's broad-gauged problems will be presented in the opening keynote address.

A feature of the meeting will be a get-together conference luncheon on the opening day, February 13.

Mid-West Regional Gas Sales Conference

The sixteenth annual Mid-West Regional Gas Sales Conference, sponsored by the Residential Gas Section of the American Gas Association, will be held Monday and Tuesday, March 17-18, at the Edgewater Beach Hotel, Chicago. The last conference, held in 1941, attracted 780 persons.

Officers of the Mid-West Regional Gas Sales Council, elected at a meeting in Chicago, September 23, are J. C. Sackman, Northern Indiana Public Service Co., chairman, and B. H. Wittmann, The Peoples Gas Light and Coke Co., vice-chairman. H. D. Valentine, The Peoples Gas Light and Coke Co., was appointed conference coordinator and E. S. Finerty of the same organization will supervise the financial details.

Topics around which a program of paramount interest to sales managers will be built include: sales training, advertising, dealer participation, public relations, markets and marketing, appliance developments and competitive challenges.

The general plan of the conference will be similar to previous meetings of the Mid-West group. A home service breakfast will be held on the morning of March 18 and the conference will conclude with a dinner.

Those planning to attend are urged to make their hotel reservations as early as rangements.
possible.

American Standards Assn. Holds 28th Annual Meeting

The 28th Annual meeting of American Standards Association was held at the Waldorf-Astoria in New York, November 21-22.

Featured speakers at the meeting included His Excellency, Dr. V. K. Wellington Koo, Ambassador of China; Lieut. Gen. Ira C. Eaker, deputy commander of the Army Air Forces; and Charles E. Wilson, president of General Electric Company.

Approximately a thousand business executives, government officials and representatives of consumer groups participated in the two-day working sessions and heard Gen. Eaker discuss "Two Wars—The Last and The Next"; Dr. Koo on "The Industrial Future of China"; and Mr. Wilson on "Standards and Free Enterprise."

Addressing the delegates in various sessions were Henry B. Bryans, president of the association and executive vice president of the Philadelphia Electric Company; E. C. Crittenden, associate director of the National Bureau of Standards, Department of Commerce; and Mrs. Guy Moffett, representing the American Association of University Women and the American Home Economics Association.

H. H. Melvin Heads N. J. Utilities Group

Howard H. Melvin, general manager of Millville Utilities, was unanimously nominated for president of the New Jersey Utilities Association at its convention, November 22nd. He will succeed H. C. Thuerk, president of the New Jersey Power & Light Co. Jacob O. Herr was nominated for the vice-presidency, while Howard B. Allen was named secretary. Appointed as members of the executive committee were E. H. Warner, N. M. Argabrite, Richard M. Swift and C. J. Alfke.

Hotel and Travel Service for A.G.A. Members

Miss Gladys Hanshaw who, as assistant secretary of the Accounting and Technical Sections of the American Gas Association, has eased the burdens of many Association members by securing hotel reservations for them in New York, has been definitely assigned by H. Carl Wolf, managing director, as Secretary of Reservations and Arrangements.

In her new post, Miss Hanshaw's services in the making of hotel and travel reservations will be available to all members of the Association when in, or planning to visit New York.

CONVENTION CALENDAR

December

2-6 *Amer. Soc. Mechanical Engineers,* New York.

2-6 *National Exposition,* Power and Mech. Eng'g., Grand Central Palace, New York.

9 *Mid-West Regional Gas Sales Council,* Congress Hotel, Chicago.

10 *Residential Gas Section,* New Freedom Gas Kitchen Committee, Congress Hotel, Chicago.

January

20-23 *A.G.A. Home Service Workshop,* Netherland Plaza Hotel, Cincinnati.

February

13-14 *Residential Gas Section, Eastern Natural Gas Sales Conference,* Roosevelt Hotel, Pittsburgh.

March

17-18 *Residential Gas Section, Midwest Gas Sales Conference,* Edgewater Beach Hotel, Chicago.

20-21 *New England Gas Association,* Annual Meeting, Boston, Mass.

April

7-9 *A. G. A.-E. E. I. Accounting Conference,* Hotel Statler, Buffalo.

14-16 *Distribution and Motor Vehicle Conference,* Hotel Cleveland, Cleveland.

14-16 *G. A. M. A. Annual Meeting,* Drake Hotel, Chicago.

16-18 *Southern Gas Association,* Biloxi, Miss.

25-26 *Gas Meters Association of Florida-Georgia,* Boca Raton, Florida.

30-May 2 *A. G. A. Natural Gas Department,* Spring Meeting, Stevens Hotel, Chicago.

May

15-16 *Indiana Gas Association,* French Lick Springs Hotel, French Lick.

20-22 *Pennsylvania Gas Association,* Wernersville, Pa.

June

2-4 *Joint Production and Chemical Committee Conference,* Hotel New Yorker, N. Y.

A.G.A. Committee Chairmen meeting with Executive Committee

Technical Section Meeting

The Technical Section of the American Gas Association held its Organization Meetings for the 1946-47 Association year at the Hotel New Yorker, New York City, November 18th and 19th.

The Chairman of the Section, Mr. C. S. Goldsmith of The Brooklyn Union Gas Company, with the Vice Chairman, Mr. C. A. Cherry of The Cincinnati Gas & Electric Company, assisted the Chairman of the several committees in getting under way.

The Chemical Committee, Distribution Committee and the Gas Production Committee met all day Monday, and the Motor Vehicle Committee, Organic Sulphur Committee and the Gas Chemists' Handbook Committee met all day Tuesday.

The Managing and Advisory Committee Dinner Meeting was preceded by a meeting of the Section's newly organized Executive Committee composed of the Chairman and Vice Chairman of the Section with representatives selected from the Manufactured and Natural Gas Departments of the Association.

The general consensus was that the meetings reflected enthusiastic united effort to overcome the principal handicaps resulting from the emergency war conditions which necessarily prevailed in the industry and from which it is just emerging.

This spirit was evident in the preliminary plans outlined by the Program committees for the Annual Conferences of the Distribution and Motor Vehicle groups, the Production and Chemical Committees, scheduled for Cleveland and New York respectively, in April and June next, and for the Annual Convention of the Association in San Francisco the week of Sept. 29th to Oct. 3rd.

Technical Terms for Plastic Products

A 12-page self-contained Glossary of Chemical Names, Terms and Phrases used in the plastic and rubber industries, published by B. F. Goodrich Chemical Company, Rose Bldg., Cleveland 15, Ohio, is now available upon request to the Company. The glossary is extremely valuable to plastic material manufacturers, fabricators and designers.

Rauch Re-appointed Chairman A.G.A. Personnel Committee

Fred R. Rauch, vice-president in charge of industrial relations, Cincinnati Gas and Electric Co., Cincinnati, Ohio, has been re-appointed chairman of the Personnel Committee of the American Gas Association, it has been announced by R. H. Hargrove, president of the Association.

At a time when labor relations rank as one of the nation's paramount problems, this committee has rendered significant service to the utility industry by sponsoring a continuing series of personnel conferences and other important activities.

Mr. Rauch was employed by the Federal Government for eight years in engineering, labor relations and executive positions. He was also a member of the original Labor Management Committee of the Office of Production Management.

Plug-in Connectors for Gas Appliances

Research Bulletin No. 1064 of A.G.A. Testing Laboratories issued in August covers investigation and tests of Automatic Plug-in Connectors.

Results are presented of tests on representative samples of contemporary Plug-in Gas Connectors for compliance with tentative specifications for satisfactory performance previously prepared in connection with this project and approved by the Committee on Industrial and Commercial Gas Research, under whose supervision the work was carried out as Project IGR-51. While no connector tested showed completely satisfactory performance, possibilities are indicated of attaining satisfactory performance by appropriate modifications of design. Performance of a redesigned model is described showing it to meet the tentative specifications in all respects.

Cooperation of various utilities in obtaining samples for tests, particularly the Atlanta Gas Light Co. and Brooklyn Union Gas Co. is acknowledged in the report which was sponsored by the A.G.A. Committee on Industrial and Commercial Gas Research.

Jayne Re-appointed to Chairmanship A.G.A. Accident Prevention

Howard T. Jayne, safety inspector, The Philadelphia Gas Works Co., Philadelphia, Pa., has been re-appointed chairman of the Accident Prevention Committee of the American Gas Association to serve the 1946-1947 term, it has been announced by R. H. Hargrove, of Shreveport, president of the Association.

Mr. Jayne, has been a member of numerous public utility committees and, during the past two years, has been a member of the Executive Committee, National Safety Council, Public Utility Section. He first entered the gas industry in 1917, when he joined The United Gas Improvement Co. as cadet in The Philadelphia Gas Works Company. Mr. Jayne was also operating superintendent of the Gloversville gas plant, Fulton Gas and Electric Co., from 1920 to 1926, and has been associated with The Philadelphia Gas Works Co. in several capacities since that time. He has been safety inspector in the casualty and insurance department since 1934.

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THE CLEVELAND HEATER CO.

2310 Superior Avenue Cleveland 14, Ohio

How a Small Business Grew and Prospered

By
Joseph E. Collins

The Gas Service Station is flanked by office and warehouse buildings.

In the year 1911, the firm of Collins & Ryan was formed at Millsboro, Del. The original business was that of a grocery and hardware store. Farming implements and furniture were added later.

In 1922, a tomato factory was purchased and the canning of tomatoes was also added to the business. By the year 1925, a new and much larger store was built.

In 1927, we added livestock to the business of purchasing mules and cows in carload lots and also sold farming implements to the farmer. In 1928, we added appliances to our furniture business.

By 1934, we discontinued the grocery, farm machinery, and livestock part of the business to major in appliances. At this time, everything in appliances was added, also several more employes.

We entered the complete appliance business in 1935, this also being the beginning of our experience in the propane gas business. At first, we gave very little encouragement to prospective gas range buyers because we had been such a large retailer of kerosene stoves and ranges.

The first few gas ranges we sold were furnished by a gas company which supplied the ranges, and the customer's requirements for gas. Soon we contracted with another gas distributor and we purchased our own gas ranges from the manufacturer and also supplied the customer with their gas too.

Our sales on radios, washers, and refrigerators continued to grow. This required so much attention that the gas business actually received too little until the war stopped the sales of all appliances. However, the last year of business before the war we added "metered gas service" to our selling by the "tank system." This gave our customers a choice between "Metered-or-Tank" Service. It also proved to us that "Metered Service" was far easier to operate and more preferable to the customers. About 1943 we definitely decided to major in the gas business.

We contracted with the Solgas Division of the Sun Oil Company to furnish our gas and the engineering, furnishing, and installing of all equipment.

To our knowledge, the plant is the largest in this section of the country. The plant is large enough and so arranged to accommodate the wholesaling of propane gas to other dealers that might be located within operating distance.

The plant also includes a parts and service department for each type appliance used in a home whether it be gas or electric. All departments are equipped to do everything necessary in the repairing or refinishing of any appliance. We also have our own garage and truck, mechanics, electricians, carpenters, and plumbers.

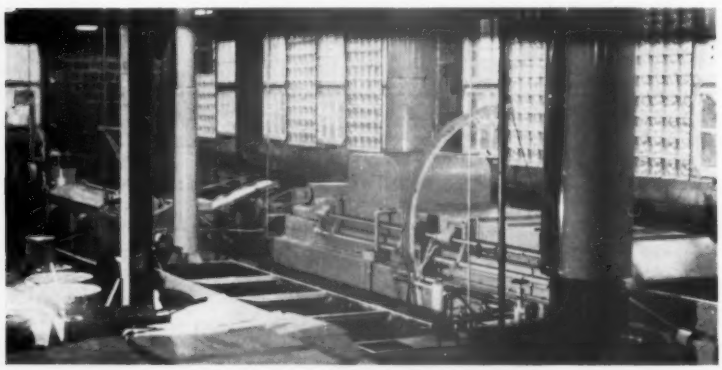
Our main office employs seven people and is located in the retail store. A direct telephone line operates from our main office to every branch of the business. At present, we operate ten trucks and two automobiles.

Gas appliances and equipment are stocked and furnished to our gas dealers at wholesale cost.

Since we entered the business back in 1935, we have always made regular monthly trips to each customer's home, regardless of the system they purchased gas on, checking their supply of gas, and replenishing their gas including billing and collecting all at the same call. Naturally, we think our service to the customer is most satisfactory.

We have a friendly agreement with our largest competitor, whereby neither of us will take the other's customer unless permission is obtained. This we are proud of and our policy is to *not* take a customer from any competitive gas company unless they so desire.

Business promises to continue clean and friendly between us all. Like others in the same business, we hope conditions will soon improve so that merchandise will once more be available in quantity.



The auxiliary shortening tank at the new Leetonia, Ohio, plant of The Dan-Dee Potato Chip Co., is to be seen at the left of the main cooker. Both units are heated with natural gas.

L. P. Gas for Erie, Pa.

Pennsylvania Gas Company is increasing its service facilities for the Erie, Pa., area by installing a Propane gas storage plant.

The Chemical Plants Division of Blaw-Knox Company was awarded the contract for design and construction of the storage plant.

Propane will be used to supplement the company's regular gas supply for industrial and residential users during the peak winter demand. The plant is scheduled for operation in January.

Gas Crisps Potato Chips Produces 600 lbs. an Hour

Natural gas is playing an important part in the constantly rising volume of potato chips and pretzels being turned out within the recently completed Leetonia, Ohio, plant of The Dan-Dee Potato Chip Co.

The J. D. Ferry Co. potato chip unit has been installed. It consists of a peeler, washer, slicer and chip cooker, together with the required conveyors. This unit slices 2,000 lbs. of potatoes per hour from which 600 lbs. of finished chips per hour are produced. The large difference in weight is accounted for by the evaporation of the vegetable's high moisture content during cooking.

The natural gas-fired chip cooker is approximately 3 ft. wide by 1½ ft. deep, and is 14 ft. long. To utilize the natural gas made available by the Natural Gas Co. of W. Va., six 2½ in. North American aspirator mixers with sealed-in burners have been installed. Each burner is individually piloted and a North American duplex double diaphragm valve protects against failure of either air or fuel. About 3,600 cu. ft. of natural gas is used each hour.

Michigan Pipe Line

The Michigan Public Service Commission has indorsed proposed construction of a new $84,000,000 natural gas pipe line to serve that state.

James W. Williams, state commission counsel, said that the need for gas in Michigan is so great that there can be no question of duplication of existing facilities. He also argued in favor of a requested $23,000,000 expansion by the Panhandle Eastern Pipeline Company.

West Ohio Gas Co. Plans Conversion to L. P. Gas

The West Ohio Gas Company, with headquarters at Lima, Ohio, has purchased all of the common stock of the Central States Gas Company, Van Wert, Ohio, according to J. D. Reid, who will manage the utility for the new owners.

The stock of Central Gas has been owned since May 1942, by J. F. Arnold, Van Wert, and his son, J. T. Arnold, Spaulding, Ohio, and John Dehner, Fort Wayne. The Central States will be eventually merged with the West Ohio Company.

Plans of the new owners include the scrapping of the old artificial gas plant within the next six months, and its replacement with a new 30,000-gallon tank installation to hold and furnish propane gas. Mr. Arnold will remain with the company for the present.

Texas Mid-Continent Elects Charles E. Simons V.P. and G.M.

Charles E. Simons, Austin, Texas, has been elected vice-president and general manager of the Texas Mid-Continent Oil and Gas Association. Mr. Simons will assume his duties Jan. 1, succeeding the late George C. Gibbons.

For the past three and one-half years, Mr. Simons has been executive vice-president of the Texas Good Roads Association. Previously he was editor of Texas Parade, a highway and travel magazine published by the Good Roads Association, and was the association's director of public relations. He directed the recent successful statewide campaign for adoption of the Good Roads Constitution Amendment which gives Constitutional protection to motor vehicle registration fees and the gasoline tax, and prevents their diversion to non-road purposes.

Irving Jensen Appointed Dealer Manager of Peoples Gas, Chicago

With the Peoples Gas, Light and Coke Company of Chicago since 1918, Irving Jensen was recently appointed Manager of the Dealer Division of that company.

Jensen brings to his present activities a broad background of experience, especially in sales work in the Chicago market with which he is thoroughly familiar. He has sold "house-to-house," held positions in sales supervisory capacities, and for some time was a dealer representative in the division he now manages.

Air Conditioning School at Servel Offers Instruction

New school room facilities in the Air Conditioning Divison at Servel, Inc. were used for the first time during an application engineering school at Evansville, Indiana, November 11 to November 15. Twenty-eight gas utility men from over the United States attended the school.

Installed in the new school room are two Servel All-Year Gas Air Conditioners which were used and operated by the "students" at the school.

Calculation of cooling and heating loads, air distribution problems, and presentation of the Servel product itself were some of the topics for the five-day school. The sessions concluded wtih a tour through the air conditioning manufacturing division at Servel.

Representatives for 24 utility companies in 15 states attended the air conditioning service school November 18 through November 22 at Servel, Inc., Evansville, Indiana. New school room facilities of the Servel Air Conditioning Division were used for the first time as a service school.

R. E. Davis, Servel air conditioning service manager, had charge of the school, assisted by A. J. Gilbreath, H. H. Phipps, Edward Head, Chester Attwood, Paul Williams, and Don Smith, all of the Air Conditioning Division.

School sessions covered problems likely to occur in servicing the Servel All-Year Gas Air Conditioner.

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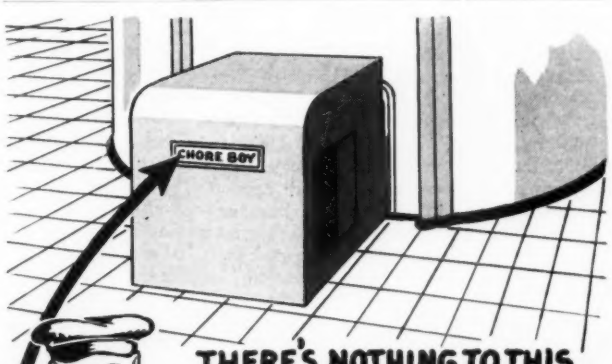


THERE'S NOTHING TO THIS INSTALLATION JOB—JUST TAKE IT OUT OF THE BOX AND SET IT IN THE FURNACE
CHORE BOY
A. G. A. Certified
★ FACTORY ASSEMBLED AND TESTED
★ HIGHEST QUALITY CONTROLS FOR COMPETENT, FULL AUTOMATIC OPERATION
★ SINGLE FULL THROAT BURNER WITH INSTANT IGNITION PILOT IN DIRECT CONTACT
★ ASHPIT DOOR PLATE FURNISHED
COMBUSTION SPECIALISTS SINCE 1914
Standard Fuel Engineering Co.
667 Post Avenue S., Detroit 17, Mich.

Ideal illumination floods the stage and individual models in this display of Universal Gas Ranges.

Cribben and Sexton Completes "Blue Flame Room"

For a proper setting to present and demonstrate Universal Gas Ranges, Cribben and Sexton Company have recently completed a beautiful display room in a building adjacent to their Chicago factory, as shown in the adjoining view.

Finished in aqua green and light rose, flooded with indirect fluorescent lighting, this large, beautiful room is equipped to feed 100 or seat 125 persons at one time.

Called the "Blue Flame" room, it features a New Freedom Gas Kitchen on the stage. Bordering the auditorium are the various models of Universal Gas Ranges placed in front of a background of fluted glass panels with indirect lighting.

Behind the stage is located a work-kitchen, containing a battery of Universal Gothams. A special heating and air conditioning system serves the entire area.

The "Blue Flame" room will be principally used to demonstrate and romance the lure of modern gas cooking to department, furniture and utility personnel. This is an important phase of Cribben's expanded salesmen-educational program.

High Percentage of Gas Heating in Central Michigan

The gas business was started in Alma about 1914. In 1913 R. B. Wagner, a Grand Rapids engineer, was granted a franchise to operate a gas works in Alma and in 1914 he organized the Gratiot County Gas Company. This concern served the muncipalities of Alma, St. Louis, Ithaca and Breckenridge with manufactured gas. In 1925, its assets were sold to Federated Utilities Company. Consumers Power Company purchased the properties of Federated Utilities Company in 1934, at which time service was provided to approximately 1,000 customers. At present 3,910 customers are receiving natural gas service.

The Central Michigan Division has the highest saturation of space heating customers served by the Consumers Power Company, serving natural gas to 20 different communities, with 29.1 per cent of our customers using gas for space heating, this being 3.8 per cent above the Company's average in the Michigan gas area divisions and 19.6 per cent over the Panhandle gas area division.

Also in this area, four large gas P&T compressor stations pump natural gas to Lansing, Bay City, Saginaw, Flint and other communities served by the Company.

Public Service Commission Rules On Gas House-Heating

The Public Service Commission of New York has indicated approval of a proposal by Brooklyn Union Gas Company under which the utility would deny gas service for house heating purposes by new applicants, with certain exceptions, during the 1946-47 winter season. The Commission's decision is set forth in an opinion by Commissioner George A. Arkwright in which he states that the restriction, proposed by the company because of its inability to meet the increasing demand by new customers, is dictated by considerations of public safety. The opinion states that if the company will file its proposal in accordance with the Commission's conclusions, the restriction will be allowed to become effective on short notice, and expiring April 1, 1947.

Discussing the company's exceptions of cases in which gas for house heating will be supplied to new customers, or to additional installations by present customers, Commissioner Arkwright states that an additional exception should be made in cases: ". . . where, because of special or unusual conditions or circumstances the restriction will endanger life or result in serious impairment to health if space gas heating is not rendered, and satisfactory proof thereof has been filed with the company."

Because of increasing demands for gas for house-heating purposes, the Westchester Lighting Company was authorized by the Public Service Commission to restrict temporarily the supply of gas for heating to new customers, except in cases where gas heating equipment has already been installed. The restriction was declared necessary to guard against overloading distribution facilities.

Further Restrictions Allowed on Gas House-Heating

Two gas companies serving a large area in the western part of New York State were granted permission November 22nd by the Public Service Commission to deny gas service for house heating purposes to new applicants, with certain exceptions, during the 1946-47 winter season. The restrictions were proposed by the companies because of their inability to meet the increasing demand for such service.

The utilities affected are the Iroquois Gas Corporation, which supplies gas service in the City of Buffalo and adjacent communities, and the Republic Light, Heat & Power Company, which operates in all or part of Erie, Niagara, Chautauqua, Genesee, Livingston, Monroe, Ontario and Wyoming Counties.

The Commission's decision with respect to the two utilities in this instance was modeled upon its action in a recent proceeding with respect to a restriction of gas for house heating by the Brooklyn Union Gas Company.

The exceptions where new applicants will be supplied service deal with prior commitments in cases such as where customers have written contracts for gas heating in effect prior to the effective date of the restriction, which in the case of the two western New York companies becomes effective immediately.

The restriction is dated to expire April 1, 1947.

R. T. Hlavin on Gas Division Detroit Brass & Mal. Wks.

Robert T. Hlavin, for several years a member of the staff of the American Gas Association testing laboratories, has joined the Gas Valve Division of the Detroit Brass and Malleable Works as assistant to William J. Wildren, manager of the division.

Mr. Hlavin had been associated with the A.G.A. since his graduation as a Chemical Engineer from Case School of Applied Science. In his four years affiliation with the A.G.A. he served as a test engineer in the Central Heating Laboratory and as "Test Engineer in Charge" of the Water Heater, Range and Space Heater laboratories. His experience and knowledge of gas appliances was furthered by almost two years of service in the capacity of a Field Inspector.

Bodeen Becomes Supervisor of Sales, Iowa City

Selection of Leland D. Bodeen, Moline, Ill., as Sales Supervisor of the Iowa City District of the Iowa-Illinois Gas and Electric Company has been announced by J. M. Hollingsworth, Sales Promotion Manager. He replaces G. M. Sheets, who has accepted a position with the Central Survey Company, Shenandoah, Iowa.

Greene Re-appointed Chairman A.G.A. Membership Comm.

Joseph N. Greene, president of the Alabama Gas Company, Birmingham, has been re-appointed chairman of the Membership Committee of the American Gas Association, it has been announced by R. H. Hargrove, president of the Association. Mr. Greene, who is an A.G.A. director, will be assisted by a group of gas company executives representing different sections of the country.

During the Association year ending September 30, 1946, a large number of new members were added as a result of the activity of the committee.

O'Connor Inspects European Gas Fields for Dresser Co.'s

Back from a four weeks' trip to England and the Continent, John B. O'Connor, Executive Vice-President of Dresser Industries, Inc., reports a sizable gas field development under way in Southern France and considerable activity in Czechoslovakia where he had occasion to visit a very large coal gasification plant where both synthetic gasoline and fuel oil are being made by reducing coal with oxygen. This plant is also producing relatively high Btu gas from coal and piping it directly from the generators into Prague, a distance of about 100 miles.

Shortage of solid fuels in France, according to O'Connor, is providing the impetus to exploration and active development of gas fields south and west of Toulouse.

"Structure of the new fields was worked out in 1937 and the first well brought in early in January, 1939," O'Connor reports. "Today, with the war behind them, the French, through a company financed jointly by government and private capital, have completed a 12-inch pipeline to Toulouse, a 5-inch line to Tarbes, and have others under construction to neighboring industrial centers."

Two Dresser companies are already shipping equipment to the French for this program which O'Connor believes may grow to sizable proportions. International Derrick and Equipment Company is supplying drilling equipment, while Clark Bros. Co., Inc., Olean, New York, recently completed compressors for installation in a plant erected in the St. Marcet field to extract natural gasoline from gas and deliver the dry gas by pipeline to Toulouse and intermediate points. This line, according to O'Connor, is expected to be extended later to Bordeau and Marseille.

Underground Gasification of Coal in Belgium

Belgium Government funds are being used to carry on experiments at The Bois-la-Dame coal mines on underground gasification. The project permits the utilization of coal in seams which, due to the geological formation and labor costs, render mining operations uneconomical and difficult. *Genie Civil*, May, 1946, p. 116.

The Coal Mine Gas Generator

Under this title, an article J. Catte appeared in *France Energetique*, Sept. and Oct., 1945. The method of underground coal gasification now employed in Russia is described. It gives practical variables involved, gas obtained, factors influencing the quality of gas, use of additional oxygen with forced air, economical results. A Belgian company has been formed to study the process in a Belgian mine.

Cincinnati Gas & Electric Co. Announces Promotion

Promotion of four men in the Gas Production Department has been announced by M. J. Pfeiffer, manager.

Under the change of organization J. P. Stephens, general superintendent of the department, is elevated to the newly created post of assistant manager.

William K. Backer, superintendent of East Works, takes over the assignment of general superintendent of the department and will be in charge of all operations of the department outside of the Fourth & Main offices.

J. A. Bene, general foreman of the Northern Division, succeeds Mr. Backer as superintendent of East Works and Moss Bundren becomes general foreman of the Northern Division.

McCarter Medal Awarded Cincinnati Gas Employee

Official recognition of their heroic actions in saving the life of a fellow worker last May was received by four employees of East End Gas Works with the presentation of the American Gas Association's McCarter Medal and Certificates.

Winner of the AGA's top-flight award, the McCarter Medal, was Harless Kitts, boiler operator at East Works. Mr. Kitts was the first person to apply the prone pressure method of resuscitation after Ray Langenbahn, gas maker, was overcome by carbon monoxide fumes May 12 while making repairs on a water line 35 feet above the ground at East End.

Others who figured in the rescue were Marvin Auffart, 2nd class gas maker; George McCullum, shift foreman, and Arlie Grimes, assistant operator.

Mr. Auffart received the McCarter Certificate of Assistant and Mr. Collum and Mr. Grimes were awarded the McCarter Certificate of Recognition.

C. A. Massa Promoted with Columbia System Gas Co's.

Charles A. Massa was advanced by The Manufacturers Light and Heat Co. on November 1, to the position of Senior Assistant Treasurer.

Mr. Massa joined the Columbia system of natural gas companies in February, 1930. Assuming the responsibilities of a rate engineer, he had initial headquarters in Columbus, O. and a few months later came to Pittsburgh in the same capacity.

Since June, 1945, the new financial executive has been Tax Agent and Chief Statistician for the Pittsburgh Group of the Columbia natural gas companies, of which The Manufacturers Light and Heat Co. is a part. Mr. Massa will continue to make Pittsburgh his headquarters.

THE GOODMAN STOPPER

Now has the "Z" handle for easy manipulation. When locked in place it holds. Stopper cannot slip. Gas cannot pass. Adjusted in 30 seconds.

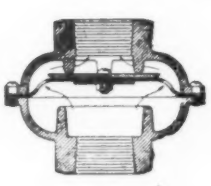
Ask for circulars on this and other distribution equipment.

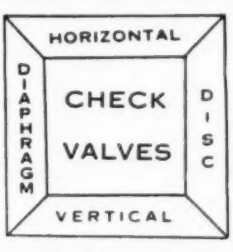
Nearly a half century of service to the Gas Industry.

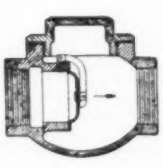
The Reliable Shut-Off for Street Mains

Safety Gas Main Stopper Co.
523 Atlantic Avenue. Brooklyn. New York

Pressure Controls for Gas and Air







NORWALK VALVE COMPANY

Manufacturers of Connelly Governors, Valves and Gauges

33 Railroad Ave. South Norwalk, Conn.

Jalass, General Sales Manager, Cribben & Sexton Co.

Harold E. Jalass has been appointed General Sales Manager of Cribben and Sexton Company, Manufacturers of Universal Gas Ranges, according to an announcement made today by W. M. Hillborn, Executive Vice President of the Company.

H. E. Jalass

Mr. Jalass joined Cribben and Sexton in 1917 and was added to its sales staff in 1922. For the past 15 years he was District Manager of the metropolitan Chicago area, during which time he conducted over 1500 point-of-sale demonstrations before groups ranging from 25 to 200 persons. In August Mr. Jalass was appointed Assistant General Sales Manager to John E. Bogan, whom he now succeeds.

American Stove Co. Receives Awards for Annual Report

American Stove Company received two national awards recently from *Financial World* for the quality of its 1945 annual report, according to a recent announcement from that publication.

The Citation of Excellence was awarded Arthur Stockstrom, president, for having published the second best report in the household equipment industry. 1,500 entries were considered in the 1946 competition covering 1945 reports. The top 38 per cent, including Magic Chef, were given Awards of Merit in July, with these entries then going before a second board of judges for "best in industry" decisions.

Clipper Manufacturing Co. Completes New Factory

Clipper Manufacturing Co. has centralized their factory and general office in a new building at 2800 Warwick, Kansas City, Mo. Here a laboratory will also be maintained for testing masonry saw blades on various refractories and building material.

Warehouse will be retained at St. Louis, Mo. for local distribution.

The present executive personnel includes Neligh Coates, Pres.; Robt. G. Evans, Asst. Gen. Mgr. and A. Wiedmann, Sales Manager.

Review Conversion Burner Requirements

Instituting a series of meetings for the purpose of reviewing and revising American Standards for conversion burners, the A.G.A. Approval Requirements Subcommittee on Installation and Listing Requirements for Gas Conversion Burners met at the Cleveland Laboratories on October 29 for the initial session of the series.

Construction sections of the listing requirements were discussed with resumption of the talks scheduled for December.

Due to the sudden popularity of gas house heating in many sections of the country with particular emphasis in the conversion burner field, interest in strengthening conversion burner requirements and revising them to meet present needs has been strong. Approximately 50 new companies have entered the field recently, submitting equipment to the Laboratories for approval. This is several times the number appearing in the Directory of Approved Gas Appliances and Listed Accessories before the war.

A New Pipe Book of Value To Engineers

Acipco's new book on the Molox Ball-and-Socket Joint and Doublex Simplex Lock-Joint contains many tables of dimensions, weights and thicknesses, always of value to designing engineers. The book also contains many diagrams of installation methods and numerous photographs of installations under way. Copy available by writing American Cast Iron Pipe Co., Birmingham, Ala.

GEORGE TRENHOLM MACBETH
CONSULTING ENGINEER
FORMERLY
CHIEF GAS ENGINEER
WESTCHESTER LIGHTING CO.
14 BROOKSIDE CIRCLE
BRONXVILLE 8, N. Y.

For Real Gas-purifying Power
CONNELLY IRON SPONGE

• **To get top efficiency in gas-purification at the lowest cost, use Connelly Iron Sponge. It's the finest purification material to be had.**

Connelly Iron Sponge has a high degree of activity. It gives longer service before fouling. It revivifies more quickly. Leading gas companies have been using this "blue-ribbon" purification material for years—they know it can be relied upon to do the best job.

If you have a problem in gas-purification, take advantage of Connelly's 71 years of experience. Our engineers will be glad to help you . . . there is no obligation. Consult Connelly!

Connelly Valves, Governors, and Manometers are now manufactured and sold only by Norwalk Valve Co., South Norwalk, Connecticut. Connelly will, however, continue to manufacture and sell Gas Purification Equipment including Connelly Iron Sponge, pH Kits, Caloroptics, and BTU Control equipment in connection with propane and butane.

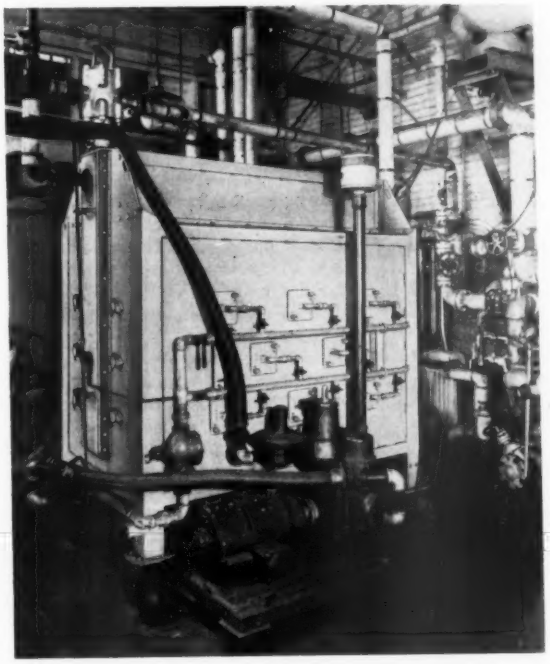
CONNELLY IRON SPONGE & GOVERNOR CO.
Elizabeth, N. J. Los Angeles, Calif.
3154 S. California Ave., Chicago 8, Illinois

GAS METERS

ARMY E NAVY

RADAR

Lambert Meter Co.
Plainfield, N. J.



Steam is superheated by continuous heating methods in the Selas Superheater. Combustion controller, in foreground, delivers correctly proportioned air-gas mixture at correct pressure to Duradiant Burners.

Portable Superheater Applies Continuous Method to Heating Gases

Steam, air and other gases are being superheated by a unique Selas method, based on continuous-heating principles, with a new order of speed and economy. This superheater, manufactured by the Selas Corporation of America, is small and compact and brought to operating heat in a matter of minutes. Temperatures to 2000°F. are uniformly maintained at pressures limited only by characteristics of heating coils.

The design lends itself to adaptation for individual heating requirements. Ideal operating conditions can be approached for each installation. Duradiant burners, which transmit a high percentage of heat by radiation, are patterned on each side of the superheater to produce the desired heat gradient.

A manufacturer of jet apparatus reports very favorably on a Selas installation for superheating steam to test jet apparatus at actual operating temperatures and pressures. Saturated steam is fed to the superheater at test pressure and temperature is raised to the value for which the jet is designed. The superheater is also used to heat air for test purposes. Thus, sufficient quantities of steam or air, economically superheated, are available on short notice. For increased convenience the superheater is mounted on wheels so that it can be moved about the test-bay as required.

New Officers of American Cast Iron Pipe Co.

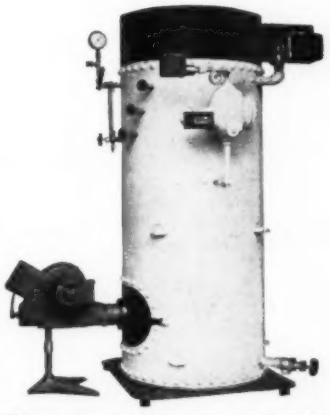
The retirement of W. D. Moore as president of the American Cast Iron Pipe Company after twenty-two years in that office, resulted in the election of Clarence Dale Barr as president of the company at the mid-year meeting of the Board of Directors.

Mr. Barr came to Acipco in 1908 as an engineer, and was promoted to chief engineer in 1909. In 1912 he became purchasing agent of the Company, and in 1913 was made assistant general manager becoming acting general manager in 1919. In 1921 he was elected vice president, and in 1937 was made secretary and vice president, which position he held at the time he became president.

S. D. Moxley, who succeeds Mr. Barr as vice president, came to Acipco as draftsman in 1923. He was promoted to chief engineer in 1926, which position he held at the time he was made vice president.

J. J. Swenson, who was elected vice president in charge of sales, and secretary, has spent his entire business life with the American Cast Iron Pipe Company. He had filled various positions in the operating department and in the main office until 1914 when he was sent to Kansas City as salesman in that territory. In 1915 he was transferred to San Francisco and made Pacific Coast sales manager, his territory covering the Pacific Coast and Hawaii. In 1927 he was made general sales manager and a director of the Company and returned to Birmingham.

LATTNER
GAS — OIL BOILER
3 HP to 35 HP.



Burns natural gas or regular furnace oils with equal efficiency using same burner.

P. M. Lattner Mfg. Company
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"A" TYPE METERS
"B" TYPE METERS
DIAPHRAGMS

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COMPLETE GAS PLANTS
INDUSTRIAL FURNACES
•
Automatic Water-Gas Controls
Hydraulically-Operated Valves
for Air, Gas, and Steam
•
The GAS MACHINERY CO.
CLEVELAND, OHIO

Gas Meter in Transparent Plastic Case Developed

Have you ever wondered how the gas meter in your cellar works?

For years the gas industry has been attempting to develop a meter which would enable a person to watch a gas meter in operation. One made of glass was developed but found to be both impracticable and too costly to manufacture. Meters with glass fronts were experimented with but these failed to show the complete operation of the meter.

Now John Addison of Newark, a meter repairman in the Newark Meter Shops of Public Service Electric and Gas Company of New Jersey, has developed a transparent plastic display meter that officials of the company's gas department believe, far surpasses any other yet developed. It shows every part of the meter in operation.

For ten months, Mr. Addison has been working on this transparent display meter in the kitchen of his home. Many times he was delayed for weeks due to his inability to obtain necessary materials.

Some of the plastic was heated to proper temperature in the oven of Mr. Addison's gas range and then formed over metal parts of the meter to the right shape. Other parts, such as valve seats and guide brackets, Mr. Addison painstakingly cut out of solid stock, a tedious job.

The proper procedure for this work was learned by Mr. Addison from technical information in public libraries and visits to manufacturers of plastics.

The meter is complete in every detail. It registers accurately. Just enough of its parts are of polished metal to give the clearest visual effect.

Mr. Addison says that he made approximately eighty per cent of the 128 parts in the meter by hand from plastics.

Harper-Wyman Appoints Battle Treas., Succeeding J. J. Toomey, Deceased

Leslie C. Battle, assistant treasurer since 1938, has been named treasurer of the Harper-Wyman Company of Chicago, to succeed the late John J. Toomey, Philip S. Harper, president, announced recently.

"Jack" Toomey, former treasurer, was widely known throughout the industry as one of the pioneers in gas range designing. He was the inventor of the reversible-oven, console type gas range which he developed and patented and was also responsible for the design of several successful combination coal and gas ranges. He retired from the stove merchandising business in 1926, following a long career in the gas industry where he worked his way up from freight handler to top sales representative with offices in Chicago. His first job in the industry was with Rathbone Sard and Company, manufacturers of Acorn stoves and ranges. At the time of his retirement he was given a farewell banquet by a group representing every stove company or its distributor doing business in the Middle West. He emerged from retirement, within a short time to join the Harper-Wyman Company as its treasurer, the position he held until his death.

I. N. G. A. of A. Holds Second Annual Meeting

The Independent Natural Gas Association of America held its second annual meeting at Fort Worth, Texas, on Nov. 22nd.

Papers presented included:

"The Natural Gas Act and Recommendations of the Natural Gas Industry Committee"—Mark H. Adams, Chairman, Legal Committee, Wichita, Kansas.

"Natural Gas Reserves"—Dr. E. De Golyer, Dallas, Texas.

"The Transportation of Natural Gas"—D. A. Huley, president, Lone Star Gas Company, Dallas, Texas.

"Natural Gas and Its Future"—Capt. E. S. Pettyjohn, Director, Gas Institute of Technology, Chicago, Illinois.

"The Producers of Natural Gas"—Dr. Frank Dotterweich, Texas A & I College, Kingsville, Texas.

"Viewpoint of Royalty Owners"—H. W. Long, Amarillo, Texas.

"Regulatory Practices"—Judge P. A. Lasley, Little Rock, Arkansas.

Laclede to Buy County Gas Co.

Laclede Gas Light Company will take over the St. Louis County Gas Company Dec. 31 if the Missouri Public Service Commission and the Securities and Exchange Commission approve, it was announced Nov. 22.

Laclede's bid of $11,250,000 was accepted by the North American Company, parent company for County Gas, and a contract signed. In addition Laclede assumes a bond obligation of $1,500,000 outstanding against County Gas, plus a $75,000 call premium, bringing the total involved to $12,825,000.

Thus County Gas will be absorbed into Laclede which will provide gas utility service for the entire metropolitan area in Missouri. This move which was favored by the City of St. Louis is expected to result in reducing the cost of operation and, by encouraging wider use of gas for heating, help reduce smoke.

Home Service Workshop

A national Home Service Workshop sponsored by the Home Service Committee of the American Gas Association will be held January 20-23 at the Netherland-Plaza Hotel, Cincinnati, Ohio. Program for the four-day workshop is being prepared by a committee headed by Mrs. Mary Belle Burnett, Cincinnati Gas and Electric Co., chairman of the A.G.A. Home Service Committee.

Purpose of the workshop is to provide home service people with up-to-date information on gas and gas appliances. The program will include food and equipment demonstrations, a full home call discussion, and talks on research, servicing and installation of gas ranges, refrigerators and laundry equipment. Other features will be a refresher course on home service organization, training for home service, and discussions of the place of home service in sales promotion.

Assisting Mrs. Burnett on the program committee are: Ruth Shank, The St. Louis County Gas Co., Webster Groves, Mo.; Helen Kirtland, The Ohio Fuel Gas Co., Columbus; Mildred Clark, Oklahoma Natural Gas Co., Tulsa; and Jessie McQueen, American Gas Association.

Rockwell Manufacturing Company Acquires Ohmer Corporation

Purchase of the Ohmer Corporation of Dayton, Ohio, by the Rockwell Manufacturing Company, Pittsburgh, has been announced by Colonel Willard F. Rockwell, Board Chairman and President.

J. Allen Harlin, who has served as President of the Dayton concern for the past year will remain with the new ownership as vice president. The company will continue to operate as the Ohmer Corporation, a wholly-owned subsidiary of Rockwell Manufacturing Company, and maintain plant and headquarters in Dayton.

Rockwell Manufacturing Company is headed by Colonel Williard F. Rockwell, prominent Pittsburgh Industrialist, who is also Chairman of the Board of Timken-Detroit Axel Company and Standard Steel Spring Company.

The addition of the Ohmer property now gives Rockwell Manufacturing Company twelve wholly-owned Subsidiaries and Divisions. These include Pittsburgh Equitable Meter Division, Pittsburgh, Pa., manufacturers of gas, water and oil meters; The Delta Manufacturing Division, Milwaukee, Wis., producers of machine tools; Nordstrom Valve Division, Oakland, Calif., whose product is lubricated plug valves; Edward Valves, Inc., East Chicago, Ind., manufacturers of cast and forged steel valves; The V & O Press Company, Hudson, N. Y.; makers of power punch presses; The Arcade Manufacturing Division, Freeport, Ill., whose products include foundry equipment and refrigeration hardware; The Crescent Machine Division, Leetonia, Ohio, woodworking machinery manufacturers; Rockwell Machine Company, Hopewell, N. J., fabricators of machined parts and assemblies; The Monessen Foundry and Machine Company, who operate an iron and brass foundry in Monessen, Pa.; A. H. Ross Company, Inc. of Ludlow, Ky., makers of packaging machinery, and Rockwell International Corporation, New York City, who serve as export distributors for Rockwell Subsidiaries and Divisions.

N. J. Kenny of Pittsburgh has been elected President of the Ohmer Corporation. In addition to Mr. Kenny the officers of the company are: W. F. Rockwell, Jr. and J. Allen Harlan, vice-presidents; E. W. Meyers, secretary-treasurer.

Centrifugal Blowers and Exhausters. Bulletin 120-B-13, covering Centrifugal blowers and exhausters, issued by Roots-Connersville Blower Corp., Connersville, Ind., is an 8-page folder in two colors stressing the wide range of applications where R-C Centrifugals have been, or may be used. Offered in both single and multi-stage types, with capacities up to 100,000 CFM, and at pressures from the lowest to the highest practicable.

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J. M. CHILCOTE

Joseph M. Chilcote, age 63, Superintendent of Production and Transmission for The Peoples Natural Gas Company, 545 William Penn Place, Pittsburgh, Pennsylvania, died November 7, at his residence, 416 Todd Street, Wilkinsburg, Pennsylvaniafi at 6:30 p.m., following an illness of several months.

He entered the employ of The Peoples Natural Gas Company at Turtle Creek, Pennsylvania, in 1908 and filled various operating assignments for the following thirty years. In 1937, he was transferred to the general offices at Pittsburgh, Pennsylvania, as Superintendent of Production and Transmission.

O. LLOYD MADDUX

O. Lloyd Maddux of the O. Lloyd Maddux Company, 53 Park Place, New York, died November 26th at All Souls Hospital, Morristown, New Jersey. He was 53 years old. Mr. Maddux was a well known industrial gas engineer and had served on several committees of the Industrial and Commercial Gas Section of the A. G. A. during recent years. He was also New York sales engineer for Eclipse Fuel Engineering Company.

HUBERT R. HUMPHREY

Hubert R. Humphrey, president and treasurer, General Gas Light Co., Kalamazoo, Mich., died Nov. 17, age 58.

A prominent figure in the gas industry, Mr. Humphrey was particularly identified with development and engineering phases of the General Gas Light Company which pioneered arc gas lighting and radiant type and portable gas heating.

He had served as president of the company following the death in 1934 of his father, Alfred Humphrey, founder of the firm.

Mr. Humphrey joined the company as a young man. Before becoming identified with the engineering and development phases of the firm he had been the firm's supervisory representative for the old gas lighting street system in New York City. The firm held the rental contract to maintain the metropolitan gas lighting system, including the famous gas lighting of the old Bowery.

After joining the General Gas Light Company here in about 1911, Mr. Humphrey in his engineering and development activity played a major role in the development of the radiant type of fireplace and portable heating which the company instituted in 1916, and industrial gas units which were placed on the market in 1928.

(Continued from page 14)
ists for the cycled dry gas. Since one volume of methane yields approximately three volumes of water gas, by cycling water gas, the dry natural gas would be available for pipe line outlets. Such operations have been discussed elsewhere (4). It now appears that we have arrived at the time when we can look upon 10,000 cubic feet of gas as one barrel of liquid hydrocarbon fractions, although such a conversion may be limited to only those fields having no pipeline outlets. Nevertheless, it has been seen that uses are being created for natural gas which heretofore had no market for fair value, and an increase in value of any substance is the surest way to bring about and enforce its conservation.

Conservation

Any discussion of the value of natural gas would be incomplete without a discussion of its conservation. Relationship between the value of gas and conservation may be found in California where a substantial market for natural gas at a reasonable field price has reduced the waste of natural gas to a minimum.

During the past years great strides have been made in overcoming the technical problems relating to the conservation of our petroleum and its derivatives. One very important trend is the exchange of factual data with the acceptance and promotion of proven good procedures by petroleum technologists—these practices following closely the principles of operation of the Interstate Oil Compact Commission. Again in conservation practices natural gas and crude oil are viewed together because about 75% of the recoverable oil produced today is lifted to the surface by gas before water drive is effective. Therefore, as we consider the conservation of oil and gas together from technological aspects it is interesting to note that States holding upwards of 90% of the nation's natural gas reserves are members of the Interstate Oil Compact Commission and that in these States conservation practices which are good are steadily being improved under State control. Therefore it seems reasonable to assume that if additional conservation measures are necessary they also should be under State control.

As has been shown, with rising values occasioned by new markets the trend in gas conservation is upward. Although strides have been made in this direction, including applied technology, it nevertheless is evident that at the moment a combination of economic and legal conditions exert the predominating influence.

These problems may be better seen when we consider the southwestern section of the country where 74% of our natural gas reserves are located. Here natural gas serves not only locally but is delivered to pipe lines which transport the gas to distant markets in the Appalachian and North Central States. Because of this the price ultimately to be paid for gas in many cases is the result of a series of governmentally controlled prices. Earnings of utility companies are controlled by the State, while the transporting pipe line company is controlled by the State Commission for intra-state lines, and by the Federal Power Commission for its inter-state lines. With price of gas to the consumer competing with other fuels, it may be clearly seen that legal conditions have profound effect upon conservation practices.

As has been pointed out, during the war period the increasing value of natural gas as a chemical raw material and fuel became evident. It was during this same period that the people of the Southwest, the center of the nation's greatest "gas condensate" reserves, became conscious of this fact as natural gas transmission lines connected their reserves with distant markets. This observation alone should give impetus to the present trend in conservation. As the war drew to a close this increasing value of natural gas was confirmed by the announcement of the hydrocol process, previously referred to, by which dry natural gas may be converted into liquid hydrocarbon on an economical basis. Thus, the establishment of new markets and discovery of new uses for large volumes of natural gas must not be minimized in the overall conservation picture. The resulting increase in intrinsic value of natural gas, combined with conservation-wide practices of state regulatory bodies, will bring about the high standards of conservation so necessary for an efficient processing of our natural gas reserves.

Conclusion

A greatly expandable natural gas industry supported by adequate reserves rendered great service during the war period at which time its increasing value was recognized and an adequate program for conservation was pursued under state control in the principal producing states. Solution of technologic problems alone was not the answer to its conservation, but as has been shown, an increase in the value of gas brought about by the establishment of new markets for dry natural gas. Rigorous and valuable research conducted by the natural gas and related industries has not only expanded their own frontiers and brought greater value to their products, but also brought advantages to competitors who until lately have not been research minded. So that natural gas and its derivatives may better serve in times of peace and be ready to help defend in times of war, its use must be allowed to expand in the truly American environment of competitive bargaining; research must continue; its conservation must remain a State right with a minimum of Federal control so that the great reserves of natural gas may be used to improve the American way of life throughout the country.

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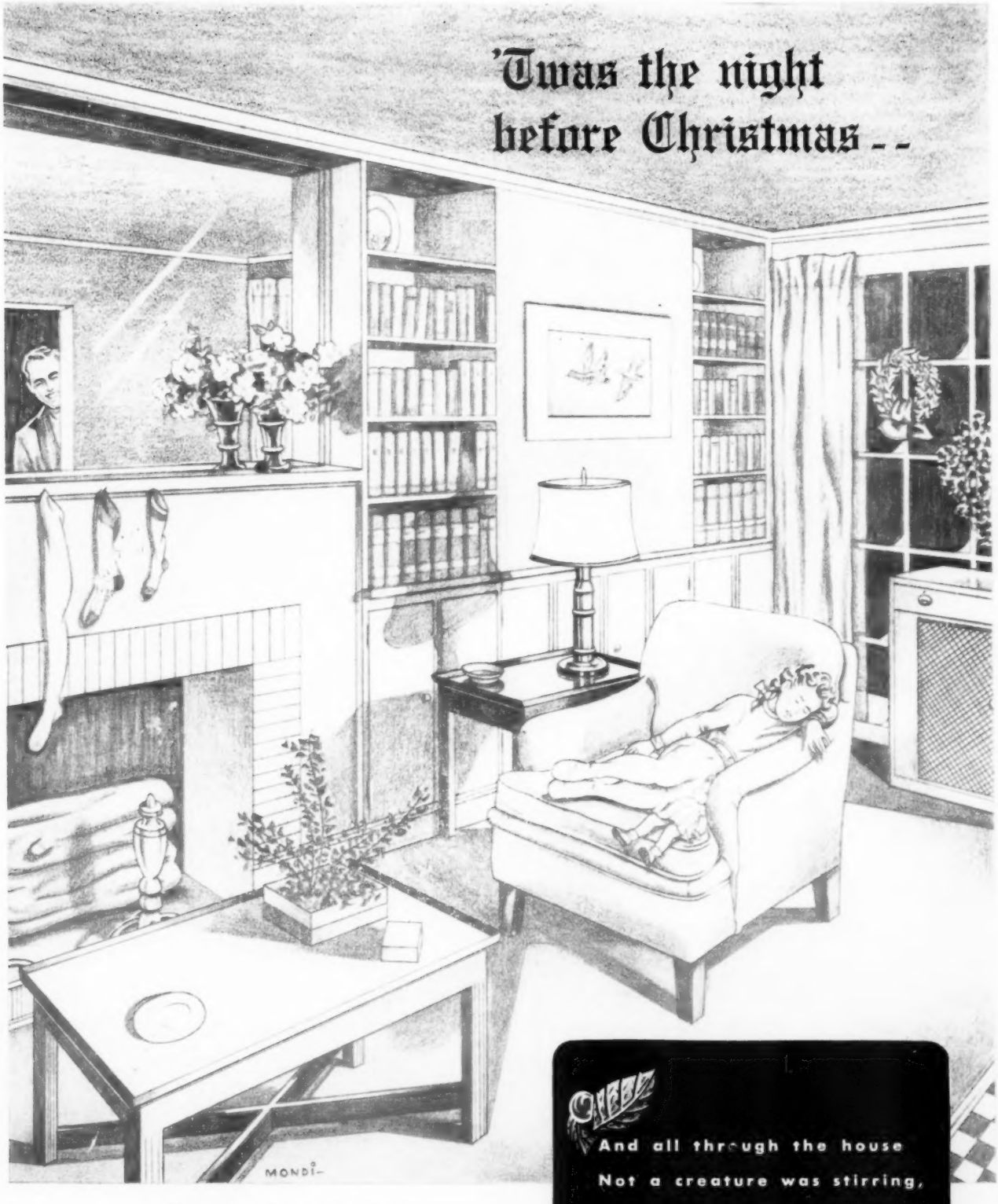

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